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THE SYSTEMATIC DESENSITIZATION TREATMENT OF NEUROSES

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Some years ago, studies on the induction and elimination of experimental neuroses in animals (23) showed that these conditions were persistent habits of unadaptive behavior acquired by learning (conditioning); and that their therapy was a matter of unlearning. The central constituent of the neurotic behavior was anxiety, and the most effective way of procuring unlearning was repeatedly to feed the animal while it was responding with a weak degree of anxiety to a "weak" conditioned stimulus. The effect of this was to diminish progressively the strength of the anxiety response to the particular stimulus so that it eventually declined to zero. Increasingly "strong" stimulus situations were successively dealt with in the same way; and finally, the animal showed no anxiety to any of the situations to which anxiety had been conditioned. The basis of the gradual elimination of the anxiety response habit appeared to be an example, at a more complex level, of the phenomenon of *reciprocal inhibition* described originally by Sherrington (17). Each time the animal fed, the anxiety response was to some extent inhibited; and each occasion of inhibition weakened somewhat the strength of the anxiety habit. The experiments suggested the general proposition that *if a response inhibitory to anxiety can be made to occur in the presence of anxiety-evoking stimuli so that it is accompanied by a complete or partial suppression of the anxiety response, the bond between these stimuli and the anxiety response will be weakened.*

I have argued elsewhere (24, 27, 28) that human neuroses are quite parallel to experimental neuroses. On this premise and during the past twelve years, the writer has applied the reciprocal inhibition principle to the treatment of a large number of clinical cases of neurosis, employing a variety of other responses to inhibit anxiety or other neurotic responses. In a recent book (27) an analysis has been given of the results in 210 patients, of whom 89 per cent either recovered or were much improved, apparently lastingly, after a mean of about 30 interviews.

In the case of neurotic responses conditioned to situations involving direct interpersonal relations, the essence of reciprocal inhibition therapy has been to instigate in the situations concerned new patterns of behavior of an anxiety-inhibiting kind whose repeated exercise gradually weakens the anxiety response habit (16, 19, 20, 25, 27, 28). Neurotic responses conditioned to stimuli other than those arising from direct interpersonal relations do not lend themselves, as a rule, to behavioral treatment in the life situation of the patient; and consulting-room applications of the reciprocal inhibition principle have been necessary. The most straightforward examples of neurotic responses requiring such measures have been the phobias. Relatively "simple" though they are, they have hitherto constituted a difficult therapeutic problem. For example, Curran and Partridge (2)

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state, "Phobic symptoms are notoriously resistant to treatment and their complete removal is rarely achieved." A very different picture is in prospect with the use of conditioning methods (1, 4, 10–12, 14, 15), which are no less effective when used for much more subtle neurotic constellations. Examples will be found below.

In the office treatment of neuroses by reciprocal inhibition, any response inhibitory of anxiety may in theory be used. The almost forgotten earliest example of therapy of this kind (7) involved inhibiting the anxiety of phobic children by feeding (just as in the animal experiments mentioned above). Conditioned motor responses have occasionally served the same end (27, p. 173); and Meyer (14) and Freeman and Kendrick (4) have made use of ordinary "pleasant" emotions of daily life (see also 27, p. 198). But the behavioral response that has had the widest application is deep muscle relaxation, whose anxiety-inhibiting effects were first pointed out by Jacobson (5, 6). It has been the basis of the technique known as *systematic desensitization* which, because of its convenience, has been most widely adopted (1, 9, 11, 12).

Though several descriptions of the technique of systematic desensitization have been published (*e.g.*, 26, 27) it is now clear that more details are needed to enable practitioners to apply it without assistance. It is the aim of this paper to present a more adequate account, and also for the first time to give a separate statistical analysis of results obtained with this treatment.

THE TECHNIQUE OF SYSTEMATIC DESENSITIZATION

It is necessary to emphasize that the desensitization technique is carried out *only after a careful assessment of the therapeutic requirements of the patient.* A detailed history is taken of every symptom and of every aspect of life in which the patient experiences undue difficulty. A systematic account is then obtained of his life history with special attention to intrafamilial relationships. His attitudes to people in educational institutions and to learning and play are investigated. A history of his work life is taken, noting both his experiences with people and those related to work itself. He is questioned about his sexual experiences from first awareness of sexual feelings up to the present. Careful scrutiny is made of his current major personal relationships. Finally, he is asked to describe all kinds of "nervousness" that may have afflicted him at any time and to narrate any distressing experiences he can remember.

The problems posed by the case are now carefully considered; and if there are neurotic reactions in connection with direct interpersonal relations, appropriate new behavior based on the reciprocal inhibition principle is instigated in the patient's life situation (19, 20, 25, 27, 28). Most commonly, it is assertive behavior that is instigated. When systematic desensitization is also indicated, it is conducted as soon as possible, and may be in parallel with measures aimed at other sources of neurotic anxiety.

Systematic desensitization is used not only for the treatment of classical phobias involving anxiety responses to nonpersonal stimulus constellations (like enclosed spaces or harmless animals), but also for numerous less obvious and often complex sources of neurotic disturbance. These may involve ideas, bodily sensations, or extrinsic situations. Examples of each are to be found in Table 1. The most common extrinsic sources of anxiety relate to people in contexts that make irrelevant the use of direct action, such as assertion, on the part of the patient. As examples, one patient reacts with anxiety to the mere presence of particular persons, another to definable categories of people, a third to being the center of attention, a fourth to people in groups, a fifth to inferred criticism or rejection, and so forth.

In all instances, *anxiety has been conditioned to situations in which, objectively, there is no danger.*

In brief, the desensitization method consists of presenting to the imagination of the deeply relaxed patient the feeblest item in a list of anxiety-evoking stimuli—repeatedly, until no more anxiety is evoked. The next item of the list is then presented, and so on, until eventually, even the strongest of the anxiety-evoking stimuli fails to evoke any stir of anxiety in the patient. It has consistently been found that at every stage a stimulus that evokes no anxiety when imagined in a state of relaxation will also evoke no anxiety when encountered in reality.

The method involves three separate sets of operations: 1) training in deep muscle relaxation; 2) the construction of anxiety hierarchies; and 3) counterposing relaxation and anxiety-evoking stimuli from the hierarchies.

TRAINING IN RELAXATION

The method of relaxation taught is essentially that of Jacobson (5) but the training takes up only about half of each of about six interviews—far less time than Jacobson devotes. The patient is also asked to practice at home for a half-hour each day.

The first lesson begins with the therapist telling the patient that he is to learn relaxation because of its beneficial emotional effects. He is then directed to grip the arm of his chair with one hand to see whether he can distinguish any qualitative difference between the sensations produced in his forearm and those in his hand. Usually he can, and he is asked to take note of the forearm sensation as being characteristic of muscle tension. He is also enjoined to remember the location of the flexors and extensors of the forearm. Next, the therapist grips the patient's wrist and asks him to pull, making him aware of the tension in his biceps; and then, instructing him to push in the opposite direction, draws his attention to the extensor muscles of the arm.

The therapist now again grips the patient's wrist and makes him tense the biceps and then relax it as much as possible, letting go gradually as the patient's hand comes down. The patient is then told to "keep trying to go further and further in the negative direction" and to "try to go beyond what seems to you to be the furthest point." He may report sensations like tingling and numbness which often accompany relaxation. When it appears that the patient has understood how to go about relaxing he is made to relax simultaneously all the muscles of both arms and forearms.

At the second lesson in relaxation, the patient is told that from the emotional point of view the most important muscles in the body are situated in and around the head, and that we shall therefore go on to these next. The muscles of the face are the first to be dealt with, beginning with the forehead. This location lends itself to demonstrating to the patient the step-like manner in which tension is decreased; and I do this by contracting the eyebrow-raising and the frowning groups of muscles in my own forehead very intensely simultaneously, and then relaxing by degrees. The patient is then made aware of his own forehead muscles and given about ten minutes to relax them as far as possible. Patients frequently report spontaneously the occurrence of unusual sensations in their foreheads, such as numbness, tingling, or "a feeling of thickness, as though my skin were made of leather". These sensations are characteristic of the attainment of a degree of relaxation beyond the normal level of muscle tone. At this session attention is drawn also to the muscles in the region of the nose (by asking the patient to wrinkle his nose) and to the muscles around the mouth (by making him purse his lips and then smile). After a few minutes he is asked to bite on his teeth, thus tensing his masseters and temporales.

The position of the lips is an important indicator of successful relaxation of the muscles of mastication. When these are relaxed, the lips are parted by a few millimeters. The masseters cannot be relaxed if the mouth is kept resolutely closed.

At the third lesson, attention is drawn to the muscles of the tongue, which may be felt contracting in the floor of the mouth when the patient presses the tip of his tongue firmly against the back of his bottom incisor teeth. Thereafter, with active jaw-opening, infra-hyoid tensions are pointed out. All these muscles are then relaxed. At the same session, the tensions produced in the eye muscles and those of the neck are noted and time given for their relaxation.

The fourth lesson deals with the muscles of the shoulder girdle, the fifth with those of the back, thorax and abdomen, and the sixth with those of the thighs and legs. A procedure that many patients find helpful is to coordinate relaxation of various other muscles with the automatic relaxation of the respiratory muscles that takes place with normal exhalation.

CONSTRUCTION OF ANXIETY HIERARCHIES

This is the most difficult and taxing procedure in the desensitization technique. Investigation of any case of anxiety neurosis reveals that the stimuli to anxiety fall into definable groups or *themes*. The themes may be obvious ones, like fear of heights, or less apparent ones, like fear of rejection.

Hierarchy construction usually begins at about the same time as relaxation training, but alterations or additions can be made at any time. It is important to note that the gathering of data and its subsequent organizing are done in an ordinary conversational way and *not under relaxation*, since the patient's *ordinary* responses to stimuli are under scrutiny.

The raw data from which the hierarchies are constructed have three main sources: 1) the patient's history; 2) responses to the Willoughby Questionnaire (22); and 3) special probings about situations in which the patient feels anxiety though there is no objective threat. Abundant material is often obtained by setting the patient the homework task of listing all situations that he finds disturbing, fearful, embarrassing, or in any way distressing.

When all identified sources of neurotic disturbance have been listed, the therapist classifies them into groups if there is more than one theme. The items of each thematic group are then rewritten to make separate lists and the patient is asked to rank the items of each list, placing the item he imagines would be most disturbing at the top and the least disturbing at the bottom of the list.

In many instances, the construction of a hierarchy is a very straightforward matter. This is true of most cases of such fears, as of heights (where the greater the height the greater the fear), or enclosed spaces, or, to take a somewhat more complex instance, fears aroused by the sight of illness in others. In such instances as the last, exemplified in Case 1 below, although the items have only a general thematic linkage and do not belong to a stimulus continuum (as do, for example, the items of a height hierarchy), all that has to be done is to obtain a list of situations embodying illnesses in others and then to ask the patient to rank the items according to the amount of anxiety each one arouses.

In other cases, hierarchy construction is more difficult because the sources of anxiety are not immediately revealed by the patient's listing of what he avoids. For example, it may become clear that he reacts to social occasions with anxiety, and that different kinds of social occasions (*e.g.* weddings, parties, and musical evenings) are associated with decreasing degrees of anxiety. There may then be a temptation to arrange a hierarchy based on these types of social occasions, with weddings at the top of the list and musical evenings at the

bottom. Usually, little effective therapy would follow an attempt at desensitization based on such a hierarchy, and more careful probing would almost certainly reveal some facet of social occasions that is the real source of anxiety. Frequently, fear and avoidance of social occasions turns out to be based on fear of criticism or of rejection; or the fear may be a function of the mere physical presence of people, varying with the number of them to whom the patient is exposed. The writer once had a patient whose fear of social situations was really a conditioned anxiety response to the smell of food in public places. A good example of the importance of correct identification of relevant sources of anxiety is to be found in a previously reported case (27, p. 152) where a man's impotence was found to be due to anxiety related not to aspects of the sexual situation as such, but to the idea of trauma, which in certain contexts, especially defloration, enters into the sexual act.

It is not necessary for the patient actually to have experienced each situation that is to be included in a hierarchy. The question before him is of the order that, "If you were today confronted by such and such a situation, *would you expect* to be anxious?" To answer this question he must *imagine* the situation concerned, and it is usually not much more difficult to imagine a merely possible event than one that has at some time occurred. The temporal setting of an imagined stimulus configuration scarcely affects the responses to it. A man with a phobia for dogs has about as much anxiety to the idea of meeting a bulldog on the way home this evening as to recalling an encounter with this breed of dog a year previously.

A small minority of patients do not experience anxiety when they imagine situations that in reality are disturbing. In some of these, anxiety is evoked when they *describe* (verbalize) the scene they have been asked to imagine. As in other patients, the various scenes can then be ranked according to the degree of anxiety they evoke.

To a therapist inexperienced in the construction of anxiety hierarchies, the most common difficulty to be encountered is to find that even the weakest item in a hierarchy produces more anxiety than can be counteracted by the patient's relaxation. In many cases, it is obvious where weaker items may be sought. For example, in a patient who had an anxiety hierarchy on the theme of loneliness, the weakest item in the original hierarchy—being at home accompanied only by her daughter—was found to evoke more anxiety than was manageable. To obtain a weaker starting point all that was needed was to add items in which she had two or more companions. But it is not always so easy, and the therapist may be hard put to find manipulable dimensions. For example, following an accident three years previously, a patient had developed serious anxiety reactions to the sight of approaching automobiles. At first it seemed that anxiety was just noticeable when an automobile was two blocks away, gradually increasing until a distance of half a block and then much more steeply increasing as the distance grew less. This, of course, promised plain sailing, but at the first desensitization session even at two blocks the imaginary car aroused anxiety much too great to be mastered: and it was revealed that the patient experienced anxiety at the very prospect of even the shortest journey by car, since the whole range of possibilities was already present the moment a journey became imminent. To obtain manageable levels of anxiety, an imaginary enclosed field two blocks square was postulated. The patient's car was "placed" in one corner of the field and the early items of the hierarchy involved a trusted person driving his car up to a stated point towards the patient's car, and of bringing this point ever closer as the patient progressed. Another case in whom weak anxiety stimuli were not easily found

was a patient with a death phobia, whose items ranged in descending order from human corpses through such scenes as funeral processions to dead dogs. But even the last produced marked anxiety, when they were imagined even at distances of two or three hundred yards. A solution was found in retreating along a temporal instead of a spatial dimension, beginning with the (historically inaccurate) sentence, "William the Conqueror was killed at the Battle of Hastings in 1066."

DESENSITIZATION PROCEDURE

When the hierarchies have been constructed and relaxation training has proceeded to a degree judged sufficient, desensitization can then begin. First "weak" and later progressively "strong" anxiety-arousing stimulus situations will be presented to the imagination of the deeply relaxed patient, as described below.

When relaxation is poor, it may be enhanced by the use of meprobamate, chlorpromazine, or codeine given an hour before the interview. Which drug to use is decided by trial. When pervasive ("free-floating") anxiety impedes relaxation, the use of carbon dioxide-oxygen mixtures by La Verne's (8) single inhalation technique has been found to be of the greatest value (27, p. 166) and with some patients this method comes to be used before every desensitization session. In a few patients who cannot relax but who are not anxious either, attempts at desensitization sometimes succeed, presumably because interview-induced emotional responses inhibit the anxiety aroused by the imagined stimuli (27).

It is the usual practice for sessions to be conducted under hypnosis with the patient sitting on a comfortable armchair. He may or may not have been hypnotized in an exploratory way on one or more occasions during earlier interviews. With patients who cannot be hypnotized, and in those who for any reason object to it, hypnosis is omitted and instructions are given merely to close the eyes and relax according to instructions. (There is a general impression that these patients make slower progress.)

The patient having been hypnotized, the therapist proceeds to bring about as deep as possible a state of calm by verbal suggestions to the patient to give individual attention to relaxing each group of muscles in the way he has learned.

The presentation of scenes at the first session is to some extent exploratory. The first scene presented is always a neutral one—to which a patient is not expected to have any anxiety reaction whatsoever. This is followed by a small number of presentations of the mildest items from one or two of the patient's hierarchies. To illustrate this, we shall make use of a verbatim account of the first session of Case 2, whose hierarchies are given below. After hypnotizing and relaxing the patient, the therapist went on as follows.

"You will now imagine a number of scenes very clearly and calmly. The scenes may not at all disturb your state of relaxation. If by any chance, however, you feel disturbed, you will be able to indicate this to me by raising your left index finger an inch or so. (*Pause of about 10 seconds*) First, I want you to imagine that you are standing at a busy street corner. You notice the traffic passing—cars, trucks, bicycles, and people. You see them all very clearly and you notice the sounds that accompany them. (*Pause of about 15 seconds*). Now, stop imagining that scene and again turn your attention to your muscles. (*Pause of about 20 seconds*). Now, imagine that it is a work day. It is 11 A.M. and you are lying in bed with an attack of influenza and a temperature of 103°. (*Pause of about 10 seconds*). Stop imagining the scene and again relax. (*Pause of 15 seconds*) Now, imagine exactly the same situation again. (*Pause of 10 seconds*) Stop imagining the scene and relax. (*Pause of about 20 seconds*) Now, I want you to imagine that

you are at the post office and you have just sent off a manuscript to a journal. (*Pause of 15 seconds*) Stop imagining the scene and only relax. (*Pause of about five seconds*) In a few moments, I will be counting up to five and you will wake up feeling very calm and refreshed. (*Pause of about five seconds*) One, two, three, four, five. (*The patient opened his eyes looking somewhat dazed*).

On being brought out of the trance, the patient is asked how he feels and how he felt during the trance, since it is important to know if a calm basal emotional state was achieved by the relaxation. He is then asked to indicate whether the scenes were clear or not. (It is essential for visualizing to be at least moderately clear.) Finally, the therapist inquires whether or not any of the scenes produced any disturbance in the patient, and if they did, how much. It is not common for a patient to report a reaction to the neutral control scene. It is worth remarking that even though the patient has a signal at his disposal with which to indicate disturbance, the fact that he has not done so during a scene by no means proves that it has not disturbed him at all, for it is a rare patient who makes use of the signal if only mildly disturbed. But the provision of a signal must never be omitted, for the patient will use it if he has a strong emotional reaction, which may not be otherwise manifest. *Exposure, and prolonged exposure in particular, to a very disturbing scene can greatly increase sensitivity*. With less marked disturbance there may be perseveration of anxiety, which makes continuance of the session futile.

At subsequent sessions, the same basic procedure is followed. If at the previous session there was a scene whose repeated presentations evoked anxiety that diminished but was not entirely extinguished, that scene is usually the first to be presented. If at the previous session the final scenes from a hierarchy ceased to arouse any anxiety, the scene next higher is now presented, except in a few patients who, despite having had no anxiety at all to a final scene at a previous session, again show a small measure of anxiety to this scene at a subsequent session. It must again be presented several times until all anxiety is eliminated before going on to the next scene.

In order to gauge progress, the following procedure is adopted after two to four presentations of a particular scene. The therapist says, "If you had even the slightest disturbance to the last presentation of this scene, raise your left index finger now. If you had no disturbance, do nothing." If the finger is not raised, the therapist goes on to the next higher scene in the hierarchy. If the finger is raised, the therapist says, "If the amount of anxiety has been decreasing from one presentation to the next, do nothing. If it has not been decreasing, raise your finger again." If the finger is now not raised, this is an indication for further presentations of the scene, since further decrements in anxiety evocation may be confidently expected; but if it is raised, it is clear that the scene is producing more anxiety than the patient's relaxation can overcome, and it is therefore necessary to devise and interpose a scene midway in "strength" between this scene and the last one successfully mastered.

There is great variation in how many themes, how many scenes from each, and how many presentations are given at a session. Generally, up to four hierarchies are drawn upon in an individual session, and not many patients have more than four. Three or four presentations of a scene are usual, but ten or more may be needed. The total number of scenes presented is limited mainly by availability of time and by the endurance of the patient. On the whole, both of these quantities increase as therapy goes on, and eventually almost the whole interview may be devoted to desensitization, so that whereas at an early stage eight or ten presentations are the total given at a ses-

sion, at an advanced stage the number may rise to 30 or even 50.

The *duration* of a scene is usually of the order of five seconds, but it may be varied according to several circumstances. It is quickly terminated if the patient signals anxiety by spontaneously raising his finger or if he shows any sharp reaction. Whenever the therapist has a special reason to suspect that a scene may evoke a strong reaction he presents it with cautious brevity—for one or two seconds. By and large, early presentations of scenes are briefer, later ones longer. A certain number of patients require fifteen or more seconds to arrive at a clear image of a scene.

The *interval* between scenes is usually between ten and twenty seconds, but if the patient has been more than slightly disturbed by the preceding scene, it may be extended to a minute or more, and during that time the patient may be given repeated suggestions to be calm.

The *number* of desensitizing sessions required varies according to the number and the intensity of the anxiety areas, and the degree of generalization (involvement of related stimuli) in the case of each area. One patient may recover in as few as a half-dozen sessions; another may require a hundred or more. The patient with a death phobia, mentioned above, on whom a temporal dimension had to be used, also had two other phobias and required a total of about a hundred sessions. To remove the death phobia alone, a total of about 2,000 scene presentations were needed.

The *spacing* of sessions does not seem to be of great importance. Two or three sessions a week are characteristic, but the meetings may be separated by many weeks or take place daily. Occasional patients, visiting from afar, have had two sessions in a single day. Whether sessions are massed or widely dispersed, there is almost always a close relation between the extent to which desensitization has been accomplished and the degree of diminution of anxiety responses to real stimuli. Except when therapy is nearly finished, and only a few loose ends of neurotic reactions are left (that may be overcome through emotions arising spontaneously in the ordinary course of living (27)), very little change occurs, as a rule, between sessions. This was strikingly demonstrated by Case 1 (below) in whom the marked improvement of a severe claustrophobia achieved by a first series of sessions remained almost stationary during a three and one-half year interval, after which further sessions overcame the phobia apparently completely.

EXAMPLES OF HIERARCHIES FROM ACTUAL CASES

Single or multiple anxiety hierarchies occur with about equal frequency. Each of the following two cases had multiple hierarchies. (*The most disturbing item, as always, is at the top of each list with the others ranked below it.*)

CASE 1

Mrs. A. was a 50-year-old housewife, whose main complaint was of very disabling fears on the general theme of claustrophobia. The fears had begun about 25 years previously, following a terrifying experience with general anesthesia, and had subsequently spread in a series of steps, each associated with a particular experience, to a wide range of situations. The patient also had other phobias, the most important of which, concerning illness and death, had its origin during childhood. In 46 desensitization sessions between March and July, 1956, all phobias were overcome except the most severe of the claustrophobic possibilities indicated in the first three items of the hierarchy given below, and with item 4 still incompletely conquered therapy was terminated when the writer went overseas for a year. The patient returned to treatment in October, 1959, having maintained her recovery in all areas, but having made very little additional progress. During the next two months, 16 additional sessions were devoted to desensitizing to numerous scenes relevant to the "top" of the claustrophobia hierarchy. She was eventually able to accept, in the session, being confined for two hours in an imagined room four feet square, and reported complete freedom from fear in tunnels and only slight anxiety in "extreme" elevator situations.

Hierarchies

A. *Claustrophobic Series*

1) Being stuck in an elevator. (The longer the time, the more disturbing.)
2) Being locked in a room. (The smaller the room and the longer the time, the more disturbing.)
3) Passing through a tunnel in a railway train. (The longer the tunnel, the more disturbing.)
4) Traveling in an elevator alone. (The greater the distance, the more disturbing.)
5) Traveling in an elevator with an operator. (The longer the distance, the more disturbing.)
6) On a journey by train. (The longer the journey, the more disturbing.)
7) Stuck in a dress with a stuck zipper.
8) Having a tight ring on her finger.
9) Visiting and unable to leave at will (for example, if engaged in a card game).
10) Being told of somebody in jail.
11) Having polish on her fingernails and no access to remover.
12) Reading of miners trapped underground.

B. *Death Series*

1) Being at a burial.
2) Being at a house of mourning.
3) The word *death*.
4) Seeing a funeral procession. (The nearer, the more disturbing.)
5) The sight of a dead animal, *e.g.*, cat.
6) Driving past a cemetery. (The nearer, the more disturbing.)

C. *Illness Series*

1) Hearing that an acquaintance has cancer.
2) The word *cancer*.
3) Witnessing a convulsive seizure.
4) Discussions of operations. (The more prolonged the discussion, the more disturbing.)
5) Seeing a person receive an injection.
6) Seeing someone faint.
7) The word *operation*.
8) Considerable bleeding from another person.
9) A friend points to a stranger, saying, "This man has tuberculosis."
10) The sight of a blood-stained bandage.
11) The smell of ether.
12) The sight of a friend sick in bed. (The more sick looking, the more disturbing.)
13) The smell of methylated spirits.
14) Driving past a hospital.

CASE 2

Dr. B. was a 41-year-old gynecological resident who had felt anxious and insecure for as long as he could remember. Five years earlier, when anxieties were intensified by divorce proceedings, he had consulted a follower of Harry Stack Sullivan, who had tided him over the immediate situation but left him with attitudes of "acceptance" which had resulted in his becoming more anxious than before. After a few weeks' assertive training, he felt considerably better, but was left with the anxious sensitivities ranked in the hierarchies below. After six desensitization sessions he was completely free from anxiety responses to any actual situations similar to those contained in the hierarchies.

Hierarchies

A. *Guilt Series*

1) "Jackson (Dean of the Medical School) wants to see you."
2) Thinks "I only did ten minutes work today."
3) Thinks "I only did an hour's work today."
4) Thinks "I only did six hours' work today."
5) Sitting at the movies.
6) Reading an enjoyable novel.
7) Going on a casual stroll.
8) Staying in bed during the day (even though ill).

B. *Devaluation Series*

1) A woman doesn't respond to his advances.
2) An acquaintance says, "I saw you in Jefferson Street with a woman." (This kind of activity had locally acquired a disreputable flavor.)
3) Having a piece of writing rejected.
4) Awareness that his skill at a particular surgical operation left something to be desired. (Anxiety in terms of "Will I ever be able to do it?")
5) Overhearing adverse remarks about a lecture he delivered that he knows was not good.
6) Overhearing, "Dr. B. fancies himself as a surgeon."
7) Hearing anyone praised, *e.g.*, "Dr. K. is a fine surgeon."
8) Having submitted a piece of writing for publication.

RESULTS

Table 1 presents basic details of 39 cases treated by desensitization. These patients,

comprising about one-third of the total number so treated up to December, 1959, were randomly selected (by a casual visitor) from the alphabetical files of all patients treated. They are considered to be a representative sample of the total treated patient population. Rather than to summarize results from nearly 150 cases, it was felt desirable to present some details about a more limited series.

Many of the patients had other neurotic response habits as well, that were treated by methods appropriate to them. Interspersed among the 39 cases reported were six others eligible for desensitization who had between two and six sessions, but who are excluded from the series because they terminated treatment for various reasons (even though usually showing some evidence of progress). It is felt proper to exclude these, as in evaluating the therapeutic efficacy of an antibiotic it would be proper to omit cases that had received only one or two doses. Also excluded are two cases that turned out to be schizophrenic. Psychotic patients do not respond to this treatment and of course receive it only if misdiagnosed as neurotic. On the other hand, every presenting neurotic case is accepted for treatment.

Outcome of treatment is judged on the basis of several sources of information. In addition to the patient's report of his reactions to stimuli from the hierarchies during sessions, there frequently is observable evidence of diminished anxious responding, inasmuch as many patients display, when disturbed, characteristic muscle tensions (such as grimaces or finger movements). The greatest importance is attached to the patient's reports of changed responses, in real life, to previously fearful situations. I have not regularly checked these reports by direct observation, but in several cases in whom I have made such checks the patient's account of his improved reaction has invariably been confirmed. In general, there is reason to accept the credibility of patients who report *gradual* improvement. A patient who wished to use an allegation of recovery in order to get out of an unsuccessful course of treatment, would be likely to report recovery rather suddenly, rather than to continue in treatment to substantiate a claim of gradual recovery.

Degree of change is rated on a 5-point scale ranging from 4-plus to zero. A 4-plus rating indicates complete, or almost complete, freedom from phobic reactions to all situations on the theme of the phobia; 3-plus means an improvement of response such that the phobia is judged by the patient to retain not more than 20 per cent of its original strength, 2-plus means 30–70 per cent, and 1-plus indicates that more than 70 per cent of the original strength of the phobia is judged retained. A zero rating indicates that there is no discernible change. (It will be noted that only 4-plus, 3-plus and zero ratings have been applicable to the patients in this series.)

Table 2 summarizes the data given in Table 1. There were 68 phobias and neurotic anxiety response habits related to more complex situations among the 39 patients, of whom 19 had multiple hierarchies. The treatment was judged effective in 35 of the patients. Forty-five of the phobic and other anxiety habits were apparently eliminated (4-plus rating) and 17 more were markedly ameliorated (3-plus rating). (It is entirely possible that most of the latter would have reached a 4-plus level if additional sessions could have been given; in cases 16 and 29, progress had become very slow when sessions were discontinued, but this was not so in the other cases.)

Among the failures, cases 8 and 18 were unable to imagine themselves within situations; case 22 could not confine her imagining to the stated scene and therefore had excessive anxiety, but was later treated with complete success by means of another conditioning method (27, p. 174); case 25 had interpersonal anxiety reactions that

TABLE 1

Basic Case Data

Patient, Sex, Age	No. of Sessions	Hierarchy Theme	Outcome	Comments
1. F, 50	62	a) Claustrophobia	++++	See case data above.
		b) Illness and hospitals	++++	
		c) Death and its trappings	++++	
		d) Storms	+++	
		e) Quarrels	++++	
2. M, 40	6	a) Guilt	++++	See case data above.
		b) Devaluation	++++	
3. F, 24	17	a) Examinations	++++	
		b) Being scrutinized	++++	
		c) Devaluation	++++	
		d) Discord between others	++++	
4. M, 24	5	a) Snakelike shapes	++++	
5. M, 21	24	a) Being watched	++++	
		b) Suffering of others	++++	
		c) "Jealousy" reaction	++++	
		d) Disapproval	++++	
6. M, 28	5	Crowds	+++	
7. F, 21	5	Criticism	++++	
8. F, 52	21	a) Being center of attention	0	No disturbance during scenes. Was in fact not imagining self in situation.
		b) Superstitions	0	
9. F, 25	9	Suffering and death of others	+++	
10. M, 22	17	Tissue damage in others	++++	
11. M, 37	13	Actual or implied criticism	++++	
12. F, 31	15	Being watched working	+++	
13. F, 40	16	a) "Suffering" and eeriness	++++	This case has been reported in detail (26).
		b) Being devalued	++++	
		c) Failing to come up to expectations	++++	
14. M, 36	10	a) Bright light	++++	
		b) Palpitations	++++	
15. M, 43	9	Wounds and corpses	+++	
16. M, 27	51	a) Being watched, especially at work	+++	No anxiety while being watched at work. Anxious at times while watched playing cards.
		b) Being criticized	++++	
17. M, 33	8	Being watched at golf	+++	
18. M, 13	8	Talking before audience (Stutterer)	0	No imagined scene was ever disturbing
19. M, 40	7	Authority figures	++++	
20. M, 23	4	Claustrophobia	++++	
21. F, 23	6	a) Agoraphobia	0	Later successfully treated by conditioned motor response method (27).
		b) Fear of falling	0	
22. M, 46	19	a) Being in limelight	+++	
		b) Blood and death	++++	
23. F, 40	20	Social embarrassment	++++	
24. F, 28	9	Agoraphobia	0	
25. F, 48	7	Rejection	+++	
26. M, 28	13	a) Disapproval	+++	
		b) Rejection	++++	
27. M, 11	6	Authority figures	++++	
28. M, 26	217	a) Claustrophobia	++++	
		b) Criticism (numerous aspects)	+++	Finally overcome completely by use of Malleson's method (13).
		c) Trappings of death	+++	
29. F, 20	5	Agoraphobia	++++	
30. M, 68	23	a) Agoraphobia	++++	
		b) Masturbation	++++	
31. F, 36	5	Being in limelight	++++	
32. M, 26	17	a) Illness and death	+++	
		b) Own symptoms	+++	

TABLE 1—*Concluded*

Patient, Sex, Age	No. of Sessions	Hierarchy Theme	Outcome	Comments
33. F, 44	9	a) Being watched	++++	
		b) Elevators	++++	
34. F, 47	17	Intromission into vagina	+++	After 15th session gradual in vivo operation with objects became possible, and subsequently, coitus with husband.
35. M, 37	5	a) Disapproval	++++	
		b) Rejection	++++	
36. F, 32	25	Sexual stimuli	++++	
37. M, 36	21	a) Agoraphobia	++++	
		b) Disapproval	++++	
		c) Being watched	++++	
28. M, 18	6	a) Disapproval	+++	
		b) Sexual stimuli	++++	Instrumental in overcoming impotence
39. F, 48	20	a) Rejection	++++	Stutter markedly improved as anxiety diminished, partly as result of desensitization, and partly due to assertive behavior in relevant situations.
		b) Crudeness of others	++++	

TABLE 2
Summary of Data of Table 1

Patients	39	
Number of patients responding to desensitization treatment	35	
Number of hierarchies	68	
Hierarchies overcome	45	91%
Hierarchies markedly improved	17	91%
Hierarchies unimproved	6	9%
Total number of desensitization sessions	762	
Mean session expenditure per hierarchy	11.2	
Mean session expenditure per successfully treated hierarchy	12.3	
Median number of sessions per patient	10.0	

led to erratic responses and, having experienced no benefit, sought therapy elsewhere.

The 39 patients had a total of 762 desensitization sessions, including in each case the first exploratory session although in many instances scenes from the hierarchies were not presented at that session. The mean number of sessions per hierarchy was 11.2; the median number of sessions given to patients 10.0. It should be noted that a desensitization session usually takes up only part of a three-quarter hour interview period, and in cases that also have neurotic problems requiring direct action in the life situation there may be many interviews in which a session is not included.

At times varying between six months and four years after the end of treatment, follow-up reports were obtained from 20 of the 35 patients who responded to desensitization. There was no reported instance of relapse or the appearance of new phobias or other neurotic symptoms. I have never observed resurgence of neurotic anxiety when desensitization has been complete or virtually so.

DISCUSSION

The general idea of overcoming phobias or other neurotic habits by means of systematic "gradual approaches" is not new. It has long been known that increasing measures of exposure to a feared object may lead to a gradual disappearance of the fear. This knowledge has sometimes (21), but unfortunately not very often, contributed to the armamentarium of psychiatrists in dealing with phobias. What is new in the present contribution is 1) the provision of a theoretical explanation for the success of such gradual approaches and 2) the descrip-

ion of a method in which the therapist has complete control of the degree of approach that the patient makes to the feared object at any particular time. The situations, being imaginary, are constructed and varied at will in the consulting room.

The excellent results obtained by this method of treatment are naturally viewed with skepticism by those who in the psychoanalytic tradition regard phobias and other neurotic anxiety response habits as merely the superficial manifestations of deeper unconscious conflicts. Some attempt to clarify the issue must be made. In the majority of cases a phobia is found to have begun at a particular time and in relation to a particular traumatic event. Before that time, presumably the patient already had his assumed unconscious conflicts, but did not feel any need for treatment. At the very least, then, it must surely be admitted that if through desensitization the patient is restored to the state in which he was before the traumatic event, something important has been gained from the point of view of his suffering. The reply could, of course, be made that unless the unconscious conflicts are brought to light and resolved, the patient will relapse or develop other symptoms; but in keeping with follow-up studies on the results of non-analytic psychotherapy in neurotic cases in general my experience has been that relapse or the appearance of new reactions is rare, unless a major group of stimuli in a desensitized area has been neglected.

At the same time, it is indisputable that only a minority of individuals exposed to a given traumatic event develop a phobia; some predisposing condition or conditions must determine which individuals do. The psychoanalysts are undoubtedly right in insisting on this point. But we are not therefore compelled to accept their version of the nature of the predisposing conditions, especially as the factual foundations of that version are far from satisfactory (30). Objective behavior theory can also point to factors that may predispose an individual to particularly severe conditioning of anxiety. First, some people are apparently endowed with much more active autonomic nervous systems than others (e.g., 18). Second, previous experience with similar stimulus constellations may have induced low degrees of anxiety conditioning which would sensitize a person to the traumatic experience. Third, there may be circumstances in the moment of trauma that may bring about an unusually high degree of focusing upon certain stimulus constellations. The second of these suggested factors is probably the most important, for patients do frequently tell of minor sensitivity having pre-existed the precipitating event. In the course of desensitization, these original sensitivities also come to be removed, along with whatever has been more recently conditioned.

Critics of the conditioned response approach to therapy of the neuroses frequently assert that when the desensitization method leads to recovery, it is not the method as such that is responsible, but the "transference" established between patient and therapist. If these critics were right—if desensitization were incidental to rather than causal of recovery—it would be expected that improvement would affect all areas more or less uniformly, and not be confined to those to which desensitization had been applied. The facts are directly contrary to this expectation, for practically invariably it is found that *unless different hierarchies have unmistakable common features desensitization to one hierarchy does not in the least diminish the reactivity to another (untreated) hierarchy*. For example, a recent patient had both a widespread agoraphobic constellation, and a fear of airplanes, extending to the sight and sound of them. Having constructed hierarchies to both series, the writer proceeded to desensitize the patient to the agoraphobia, but ignored the airplane phobia until the agoraphobia had been almost completely overcome. At this stage,

re-assessment of the airplane phobia revealed not the slightest evidence of diminution. This is in accord with observations made in connection with experimental neuroses, in which eliminating anxiety conditioned to visual stimuli does not affect the anxiety-evoking potential of auditory stimuli that were conditioned at the same time as the visual stimuli (23, 27).

From the point of view of the scientific investigator the desensitization method has a number of advantages that are unusual in the field of psychotherapy: 1) the aim of therapy can be clearly stated in every case; 2) sources of neurotic anxiety can be defined and delimited; 3) change of reaction to a scene is determined during sessions (and accordingly could be measured by psychophysiological means); 4) there is no objection to conducting therapy before an unconcealed audience (for this has been done without apparent effect on the course of therapy); and 5) therapists can be interchanged if desired.

SUMMARY

The desensitization method of therapy is a particular application of the reciprocal inhibition principle to the elimination of neurotic habits. The experimental background and some theoretical implications of this principle are discussed.

A detailed account is given of the technique of desensitization and an analysis of its effects when applied to 68 phobias and allied neurotic anxiety response habits in 39 patients. In a mean of 11.2 sessions, 45 of the neurotic habits were overcome and 17 more very markedly improved. Six month to four year follow-up reports from 20 of the 35 successfully treated patients did not reveal an instance of relapse or the emergence of new symptoms.

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SUGGESTIBILITY WITH AND WITHOUT "INDUCTION OF HYPNOSIS"[1]

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INTRODUCTION

Suggestion, suggestibility, and hypnosis have historically been closely associated from the very beginning. Braid (4), who introduced the concept and basic terminology of hypnotism, recognized this relationship. He considered suggestibility to be a characteristic of the hypnotized person, although he does not appear to have considered it a necessary and sufficient feature of it.[3] There is no question that for Braid and a great many early investigators of hypnotic phenomena there was such a thing as a hypnotic state which had the same reality as a state of sleep or of unconsciousness. Such a state was brought about by certain specific formal procedures or manipulations[4] of the subject who then would usually show enhanced suggestibility, as one of a number of more or less specific characteristics. In order to distinguish between an individual who had been affected by such procedures, and one who has not had or who is no longer under such influence, the term "waking" was coined as the antithesis of hypnotized." It was inevitable that in the course of time it should become recognized that individuals can respond to a large variety of suggestions in the absence of any formal induction of hypnosis. Thus arose the distinction between "waking" and "hypnotic" suggestibility. Once the suggestibility became separated from hypnosis, further distinctions became possible, and a host of waking suggestibilities came into being, such as prestige, nonprestige, personal, impersonal, direct, indirect suggestions, and others.

No attempt will be made here to discuss these in detail, this having already been done in a previous work by one of us (11), and more recently by Stukát (9). The upshot of past investigations seems to be that there are a number of more or less distinct waking suggestibilities, one of which, "primary" suggestibility, is especially closely related to hypnotic behavior (11). Just what this relationship is exactly has been far from clear, and has been a source of disagreement among investigators as well as the basis for a number of theories about hypnotic behavior.

It seems fairly clear, however, that there has been a general recognition that, when not hypnotized, individuals show a wide variety of responses to suggestions and that this responsiveness can be enhanced (or inhibited) in a lawful manner by various environmental influences, one of which is the formal induction of hypnosis. Strangely enough, however, little has been done in the past to empirically and directly test this proposition in a definitive manner. An early study by Barry, MacKinnon and Murray (3) reported that waking suggestibility in the form of postural sway was most alike in relaxed and daydream states and least alike in the non-relaxed waking and the relaxed waking state. The authors do not indicate the direction of the influences at work here. Furthermore, while their results lend support to the proposition that

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[3] Instead, Braid considered the presence of spontaneous posthypnotic amnesia as the necessary and sufficient condition for saying that a person had been hypnotized.

[4] Such as described in (10).

arious external and internal conditions will ffect an individual's suggestibility, they ell us little about the effects of induction roper. A number of studies reviewed elsehere (11) have been concerned with the ffects of narcotic drugs upon suggestibility, nd particularly with the question of "drug ypnosis." Such data as have been reported n this aspect again show that these drugs an, within limits, enhance waking suggestibility, but usually not in any particularly dramatic way. At least one does not observe clear-cut hypnotic behavior following the administration of these drugs unless a fair degree of suggestibility is initially present.

Many years ago, Farez (5) advocated the giving of suggestions during natural sleep to individuals found to be refractory to hypnosis. Farez found this to be a very effective method and theorized that what happened was that the subject's natural sleep was first converted into a state of hypnosis, whereupon the suggestions then took effect. In more recent times Barber (1) has reported findings which support Farez's observation that suggestions given to individuals who are initially asleep will be carried out by them in a way comparable to the way a hypnotized person would carry them out, even though no formal induction of hypnosis has been used. Lack of adequate controls makes it impossible, however, to know the true state of the subjects at the time, or the conditions prevailing immediately prior to and following the administration of the suggestions. It may be that some aspects of sleep favor the expression of suggestibility, are identical to hypnosis, or can be converted into hypnosis, but they also may have little to do with the entire matter.

Finally, Weitzenhoffer *et al.* (15), in the course of attempting to duplicate Braid's original experiments, observed that responsiveness to suggestions was increased when the subject was led to understand that hypnosis would be forthcoming by the Braid procedure, or when a formal induction of hypnosis was used (in lieu of the Braid eye-fixation method).

None of the above investigations directly tests the question of what a formal induction of hypnosis contributes. For this we must turn to Hull and his co-workers (7). They performed a number of experiments in which the basic approach was to compare the suggestibility of subjects in the absence of any formal induction of hypnosis with their suggestibility following a formal induction. In summarizing the results, Hull (7) has the following to say:

> "Taking all four studies together, we find a total of 30 subjects experimented on. Of these, 28, or 82.3 per cent, showed a greater or lesser degree of heteroactive hypersuggestibility when in a trance state. Since the number of measures made on each subject was rather meager, it is likely that some, at least, of the negative cases may be the result of inadequate sampling of the individual subject's behavior. It is likely, however, that occasional individuals do not show the phenomenon. A weighted average from all 30 subjects shows that the time of suggestion response in the trance is reduced from the normal level by a total of 38 per cent. Accordingly, one of the most widely held views concerning hypnosis is confirmed, though the amount of hypersuggestibility thus revealed, while considerable, is probably far less than the classical hypnotists would have supposed had the question ever occurred to them.
>
> "It must be remembered that the heteroactive influence upon response to suggestions of postural movement is only one of the many possible ways of securing quantitative evidence of hypersuggestibility. We may anticipate with confidence that the picture will change to a certain extent, possibly a great deal, as other methods are employed" (7, p. 298).

As Hull himself recognized, there were certain weaknesses in these investigations. The use of a single test of suggestibility,

such as postural sway, hardly samples the subject's potentialities with regard to hypnotic behavior. Another weakness in these studies was the use of eye-closure as the sole criterion of the presence of hypnosis, especially since in itself it is a poor criterion. There is excellent evidence that hypnosis can occur in the absence of any closure of the eyes, and when the latter does occur during the induction, it is by no means essential that it remain for the production of subsequent more complex hypnotic behavior. In fact, eye-closure has a relatively low correlation with a person's ability to exhibit other samples of characteristic hypnotic behavior (14). Finally, neither the susceptibility of the subjects used nor the extent to which they were hypnotized is known. It is, in fact, quite difficult to say on the basis of the reported results to what extent the subjects actually behaved *more like hypnotized persons* after the induction of hypnosis than they had prior to it, or in fact whether they actually did behave like hypnotized persons. When one considers these points, it does not seem so extraordinary that Hull's laboratory was unable to observe as much enhancement as would be expected on the basis of everyday experience with hypnotic phenomena, although we may be dealing here more with a qualitative than a quantitative aspect and Hull's figures may be entirely consistent with other observations.[5]

The result of work on the scaling of hypnotic behavior which has been a part of the ongoing research in the Laboratory of Human Development at Stanford University has placed us in an excellent position to supplement and enlarge upon the findings reported by Hull as well as to check and verify them. This, we hope, will answer in a more definitive manner the fundamental question: Does the "induction of hypnosis" contribute anything specific and measurable to hypnotic behavior and how much?

The importance of this question goes beyond being of pure academic interest. If we are going to continue to distinguish two classes of individuals—those who are hypnotized and those who are not—we need to have some well-defined basis for this other than the logically sound but scientifically trivial fact that a formal procedure known as an induction of hypnosis has, or has not, been used. This is particularly important since on the one hand there is no question that many and perhaps all phenomena seen in hypnotized individuals can also be observed in individuals who presumably have not been hypnotized.[6] On the other hand, a number of conditions, perhaps best described as altered states of awareness, do exist, which, if not identical with hypnosis, have at least some resemblance in their manifestations.

PROCEDURES

Two groups of subjects, each consisting of 30 individuals equally divided with respect to sex, were used. These two samples consisted of 56 students taking the introductory course in psychology at Stanford University; the remaining four were recruited from other classes. The subjects were all relatively unsophisticated with respect to knowledge of psychology and had had no personal experience with hypnotic phenomena. They were invited to participate in an experiment with hypnosis but it was made as clear as possible to them that they would be tested both when and when not hypnotized, and that they would not be hypnotized without first being told this was about to be done. The actual text of what each group was initially told will be presented later. One group of subjects was tested during the

[5] It can be added that one of the most important problems which remains here is that of how much one can generalize from studies of hypnotic behavior in the laboratory to hypnotic behavior outside a laboratory setting, *e.g.*, in hypnotherapy. There is much in the line of circumstantial evidence which suggests that the two situations are by no means equivalent and interchangeable.

[6] But who may be pathological, such as Charcot's hysterics (10).

Spring quarter, 1960. We will refer to it as Sample 1 or as the *Waking-Hypnosis*[7] group, since the procedure used with it was basically to administer selected suggestibility tests in the waking state first, then following an induction of hypnosis. The other group, studied during the Summer quarter, 1960, will be referred to as Sample 2, or the *Waking-Waking* group, since the basic procedure here was to test suggestibility twice in succession with an intervening neutral period consisting of the administration of items from the MMPI.[8] About half of this latter sample was recalled at a later date and run through the schedule used for the Waking-Hypnosis group. Suggestibility was tested over a broad spectrum by means of a set of 17 test-suggestions especially chosen for this investigation. The testing was carried out on an individual basis in a quiet room with the subject sitting in a comfortable upholstered chair for the greater part of the testing. A more detailed description of the physical arrangement of the room used can be found in several publications from our Laboratory (6, 14). In general, we followed the procedures prescribed in the Stanford Hypnotic Susceptibility Scale (14) as closely as was compatible with our present experimental design. The detailed treatment of the two samples folows:

1. *Sample 1: Waking-Hypnosis.*
   a. Each subject, upon reporting to the Laboratory, was conducted to the experimental room and after being seated, was told the following. "Before we begin today's experiment, I want to tell you a little about it. We are doing research on hypnosis and related topics. We are very much interested at present in comparing the way people react to suggestions when they are not hypnotized, as you are now, with the way they respond to suggestions when they are hypnotized. Since you are not hypnotized at present, we will begin by finding out how you respond to various suggestions when not hypnotized. After I get a pretty good idea of how you react when not hypnotized, I will stop the testing long enough to hypnotize you. Then after you have been hypnotized I will test you with some more suggestions. Is that clear? First I test you when you are not hypnotized, then I hypnotize you, and I will let you know when I am ready to do so, and finally I test you while you are hypnotized . . . Incidentally, do you think it is going to make a difference whether or not you are hypnotized insofar as your reactions to suggestions are concerned?" . . . Following *S*'s answer to this question he was told: "Well, perhaps you are right and perhaps not. I certainly do not know, but I will by the time this experiment is over if you will help me find out, and the best way you can do this is by cooperating with me and letting yourself have whatever experiences may come to you. Do not try to either help or hinder. Just let happen whatever you feel is going to happen when you follow my instructions. Do you have any questions? You will not be asked to do anything that might prove embarrassing to you. All right. First before we start the actual testing, I want you to experience how it feels to respond to suggestions and what suggestions are like." The Postural Sway Test (14) was then administered.
   b. The subject was then tested in the waking state with the 17-item scale. The testing was stopped as soon as the subject had failed three consecutive items. In the absence of this eventuality the entire scale was administered.

[7] The term "waking" is being used here merely as a matter of convenience and, in accordance with historical precedents, is considered synonymous with "not hypnotized."

[8] Our choice of this task was guided by our interest in checking an aspect of hypnotic behavior not relevant to the present problem. Aside from that we wanted to keep the subjects occupied for approximately the same amount of time as the induction of hypnosis, Form A or B, requires.

c. Hypnosis was induced by means of the induction technique described in the Stanford Hypnotic Susceptibility Scale, Form A.
d. Testing on the 17-item scale was resumed, *starting two items prior to the first failed item.* The same procedure was used as in (b) above.
e. *S* was dismissed after an appointment was made for the next session, which was usually about 48 hours later. Upon his return the Stanford Hypnotic Susceptibility Scale, Form B was administered in its entirety.

2. *Sample 2: Waking-Waking.*

a. Each subject, upon reporting, was conducted to the experimental room and after being seated was told the following. "Before we begin today's experiments, I want to tell you a little about it. We are doing research on hypnosis and related topics. We are very much interested at present in comparing the way people react to suggestions when they are not hypnotized, as you are now, with the way they respond to suggestions when they are hypnotized. Since you are not hypnotized at present we will begin by finding out how you respond to various suggestions when not hypnotized. I will test you twice in this fashion so as to get a good idea of your responsiveness. I will test you once, then after I get a pretty good idea of how you react, I will stop the testing and we will spend a short period of time at another task . . . after which I will test you again with suggestions while you are still not hypnotized. After this is over I will make an appointment with you for another hour when I will hypnotize you and test you while hypnotized. Is that clear? First I test you when you are not hypnotized, then we will go on to something else and then I will resume testing you when you are not hypnotized. At a later date we will do something similar to this again with you hypnotized. Today I have no intention of hypnotizing you. Incidentally, do you think it would make a difference whether or not you are hypnotized insofar as your reactions to suggestions are concerned?" . . . Following *S*'s answer to this question he was told: "Well, perhaps you are right and perhaps not. I certainly do not know, but I will by the time this experiment is over if you will help me find out, and the best way you can do this is by cooperating with me and letting yourself have whatever experiences may come to you. Do not try to either help or hinder. Just let happen whatever you feel is going to occur when you follow my instructions. Do you have any questions? You will not be asked to do anything that might prove embarrassing to you. All right. First, before we start the actual testing, I want you to experience how it feels to respond to suggestions and what suggestions are like." The Postural Sway Test (14) was then administered.
b. The subject was then tested in the waking state with the 17-item scale. The testing was stopped as soon as the subject had failed three consecutive items. In the absence of this happening, the entire scale was run through.
c. The MMPI items were administered to each subject.
d. Testing was resumed with the 17-item scale, *starting two items prior to the first failed item*, the entire scale being presented on this occasion.
e. *S* was dismissed after an appointment was made for the next session. Upon his return the Stanford Hypnotic Susceptibility Scale, Form B was administered in its entirety.

3. *Sub-sample 2: Waking-Hypnosis.* Fourteen of the subjects from the *Waking-waking* group were subsequently recalled at a later date during the summer and run through the same schedule as described earlier in Section A.

The 17-item scale mentioned earlier was the basic tool used in this investigation. For its construction, 17 test-suggestions were selected from three scales previously extensively studied and used in the Laboratory of Human Development. Eight of these items were taken from the Stanford Hypnotic Susceptibility Scale, Form A, and the remainder from two other unpublished scales which have been developed as extensions of the Stanford Hypnotic Susceptibility Scale. Prior investigations in our laboratory have shown that the various items from these scales can be ordered in degree of difficulty by the Guttman technique (6, 12–14). This fact was taken into consideration and, in contrast to the above mentioned three scales, the 17-item scale was so arranged that the items were administered in ascending order of difficulty. Since with a perfect Guttman scale, failure to pass any given item means the probability of passing the more difficult items is nil, such a scale can essentially be used as a gauge. If our 17-item scale was in fact perfect, it would enable us to state that at any given time and under any given condition an individual has relatively so much suggestibility, no more nor less. Our criterion of three successive failures was chosen as a reasonable way of taking into account the fact that we do not have a perfect Guttman scale in this instance. With this criterion and with the scale now at our disposal, we are confident that it is possible to compare an individual's suggestibility before and after the introduction of some particular treatment, or to make comparisons between individuals under the same conditions. A brief descriptive list of the items with their fail-pass criterion follows. They are listed in order of difficulty from low to high, as administered.

1. *Hand Lowering:* Starting with the subject's left hand horizontal, suggestions are given that it is getting heavy and moving downward. *Passing response:* Lowers at least six inches.
2. *Moving Hands:* Starting with the subject's arms outstretched forward and hands about a foot apart, palms facing each other, it is suggested that a force is attracting the hands toward each other and they are moving. *Passing response:* Hands move at least to within six inches of each other.
3. *Fly Hallucination:* The subject is told that a noisy and bothersome fly is flying about his head and that he wants to get rid of it. *Passing response:* Any movement, grimacing, or acknowledgment of the presence of a fly.
4. *Finger Lock:* The subject is asked to interlock his fingers and suggestions are given that he will not be able to take his hands apart. *Passing response:* Incomplete separation: Fingers still together at end of 10 seconds.
5. *Arm Rigidity:* Subject is asked to extend left arm straight out. Stiffness, rigidity and inability to bend the arm are suggested. *Passing response:* No appreciable bending (less than two inches of hand movement) in 10 seconds.
6. *Eye Catalepsy:* Inability to open the eyes is suggested. *Passing response:* Eyes remain closed at least 10 seconds.
7. *Verbal Inhibition:* Inability to say his name is suggested to the subject. *Passing response:* Name unspoken in 10 seconds.
8. *Arm Immobilization:* It is suggested that subject's right arm is too heavy to lift. *Passing response:* No rise (or less than one inch) in 10 seconds.
9. *Automatic Writing: S* is given a pencil to hold and a pad to write on. He is asked a question to which he answers "yes" or "no" and is instructed that when he answers "yes" or "no", his right hand will write the opposite. *S* is further instructed not to be aware of this act, and forget the instructions, carrying out the latter until a certain signal is given. *Passing response:* Subject carries out suggestion at least 50 per cent of the time during which a series of questions is asked him.

10. *Taste Hallucination:* The tastes of sweet and of sour are suggested separately. *Passing response:* The two tastes are experienced and at least one is strong or is accompanied by overt signs.
11. *Hallucinated Voice: S* is told someone will ask him questions over an intercom. He is to reply. *Passing response:* Answers realistically to hallucinated voice.
12. *Visual-Auditory Hallucination:* It is suggested that *S* hears and sees a record player. *Passing response:* Hears well with eyes closed and retains at least partial auditory hallucination after opening the eyes.
13. *Card Sorting: S* is told to sort an hallucinated deck of cards into several packs until told to stop, then to count the cards in each pack and those remaining in his hand. *Passing response.* Cards are sorted realistically.
14. *Anosmia:* Anosmia is suggested then tested with real and strong household ammonia. *Passing response:* Denial of odor and no overt responses.
15. *Regression: S* is first told to go back in time to a day in school when he was in the fifth or sixth grade, and later to a day in the second grade. *S* is asked both to describe what he sees in each case and to write his name and date. *Passing responses:* Clear changes in hand writing appropriate to the regression.
16. *Three Boxes: S* is told that he is going to be shown two boxes on a table. Actually three boxes differing only in color are lined up side by side on a table in front of him. If he reports seeing only two boxes, he is given a coin and asked to place it in the middle box. *Passing response:* Behavior appropriate to seeing only two boxes.
17. *Orbison Figures*: *S* is told he will be shown a blank index card in a special holder. Instead he is presented with a card bearing a special pattern. If he reports seeing a blank card a geometrical test figure is next superimposed over this pattern. *Passing response:* Test figure is seen exactly as it is (normally a distorted figure is described when the test figure is superimposed over the pattern).

In addition to these 17 items which were scored, two other unscored suggestions were used, one at the outset and one at the end. The first was *Postural Sway*, taken from the Susceptibility Scale, in which the subject is given suggestions of falling backward; and the second was suggested *Post-hypnotic Amnesia*. The first suggestion was given as a way of introducing the subject to suggestions as is done in the two forms of the Stanford Hypnotic Susceptibility Scale. The other suggestion was used as a means of anchoring more firmly the data obtained with the 17-item scale to that obtained with the Susceptibility Scale, since it turns out (6) that amnesia is an exceptionally good discriminating item.

With very minor alterations the items were otherwise worded and administered in the same manner in both the waking and the hypnotic state. Inasmuch as the scales from which the items were taken were originally designed and studied in situations in which the hypnotized subject's eyes remained closed (except where the suggested task called for the eyes to be open) it was rather arbitrarily decided that this feature would be preserved as much as possible in the waking administration. Accordingly, we asked the subjects to close their eyes prior to presenting any item. However, at the termination of each test item, the subject was requested to open his eyes. We hoped this would minimize the chances of the subject perhaps developing some degree of hypnosis as a consequence of keeping his eyes closed throughout a one hour test session.[9]

[9] There was no certainty that this device would help in this manner. We did feel, however, that it would also be helpful in allowing us to detect the development of a hypnotic state. It was quite clear in any case that no matter what we decided to do in this respect, problems would be raised which could be resolved only through a much more

TABLE 1

Performance of the Waking-Hypnosis Group (Sample 1): N = 30

Waking* (run 1)	Hypnosis* (run 2)	Hypnotic gain	Susceptibility† (run 3)
12	17	5	12
11	15	4	9
9	8	−1	10
8	11	3	10
5	8	3	12
4	12	8	11
4	4	0	10
3	4	1	4
2	2	0	3
2	11	9	11
2	2	0	9
2	2	0	5
2	2	0	5
2	3	1	8
2	2	0	7
2	2	0	3
2	3	1	3
1	2	1	2
1	5	4	7
1	4	3	9
1	9	8	11
1	1	0	4
1	0	−1	1
0	2	2	5
0	7	7	9
0	4	4	8
0	2	2	5
0	1	1	4
0	1	1	6
0	1	1	4
Mean 2.67	4.83	2.15	6.90
S.D. 3.17	4.47	3.60	3.17

* Scores obtained on a 17-point scale.
† Scores obtained on a 12-point scale.

RESULTS

The raw data obtained from our two samples as well as the respective means and standard deviations will be found in Tables 1, 2 and 3.

Largely because of the nature of the distributions, we have felt the use of nonparametric methods was desirable in the statistical analysis. Our first and foremost interest, of course, is whether the induction of hypnosis has a specific influence on suggestibility. A cursory glance at the third column in Tables 1 and 3 would certainly seem to indicate that this is the case. This seems to be further supported by the lesser effect, shown in Table 2, when a second waking run follows the first one instead of a hypnotic run. In order to ascertain this in a more definitive manner we performed a number of statistical tests on the pertinent data, as follows. A Mann-Whitney U-test applied to the susceptibility measures obtained for the two samples shows that in this respect the samples were not significantly different at the .05 level. We therefore feel

TABLE 2

Performance of the Waking-Waking Group (Sample 2): N = 30

Waking† (run 1)	Waking† (run 2)	Waking gain	Susceptibility‡ (run 3)
11*	13*	2*	11*
7*	6*	−1*	10*
5	3	−2	11
5*	4*	−1*	9*
4	5	1	10
3	2	−1	6
2	2	0	3
2*	2*	0*	5*
2*	2*	0*	8*
2*	2*	0*	3*
2	2	0	4
2*	2*	0*	6*
2	3	1	6
1*	2*	1*	6*
1	2	1	10
1	1	0	4
1	1	0	6
1	1	0	11
1	2	1	3
1	1	0	5
1*	1*	0*	9*
1	3	2	5
1*	1*	0*	4*
1*	1*	0*	4*
0*	0*	0*	4*
0*	0*	0*	0*
0	0	0	2
0	0	0	9
0	0	0	1
0*	0*	0*	3*
Mean 2.00	2.13	.13	5.93
S.D. 2.34	2.54	2.66	3.11

* Scores for the 14 Ss of Subsample 2 (Table 3).
† Scores obtained on a 17-point scale.
‡ Scores obtained a on 12-point scale.

involved design and one which did not seem justifiably called for at this point in our investigation.

TABLE 3
Performance of Subjects Selected from Sample 2 in the Waking-Hypnosis Situation (Subsample 2): N = 14

Waking* (run 1)	Hypnosis* (run 2)	Hypnotic gain	Susceptibility† (run 3)
10	14	4	11
7	9	2	10
4	10	6	9
3	7	4	6
2	3	1	6
2	2	0	5
2	3	1	8
2	4	2	3
1	6	5	9
1	1	0	4
1	1	0	4
0	3	3	4
0	1	1	0
0	5	5	3
Mean 2.50	4.92	2.43	5.86
S.D. 2.93	3.75	1.99	3.44

* Scores obtained on a 17-point scale.
† Scores obtained on a 12-point scale.

it is reasonable to conclude that we are dealing with the same population of subjects insofar as susceptibility is concerned and that any observed difference in suggestibility must be ascribed to *treatment* rather than sampling. A Wilcoxon-matched pairs signed-rank test performed on the waking and hypnotic scores of the Waking-Hypnosis group (Table 1) leads us to reject the null hypothesis at the .002 point in favor of the hypothesis *that the hypnotic scores are on the whole greater than the waking scores.* A Mann-Whitney U-test performed on the Hypnosis scores of Sample 1 and the Waking scores, second run, of Sample 2 forces us to again reject the null hypothesis at the .01 level in favor of the hypothesis *that the performance following the induction of hypnosis was superior to the second waking performance for the Waking-Waking group.* It therefore seems reasonable to conclude from this that *the induction of hypnosis had a specific enhancing effect upon suggestibility.* This can also be seen from the fact that a Mann-Whitney U-test shows the difference between Hypnotic gain (Table 1) and Waking gain (Table 2) is significant at the .01 level, as well as the fact that the waking gain in Sample 2 is not significant.

Let us now look at other subsidiary findings of no little importance. How is waking performance related to hypnotic performance? Waking performance and susceptibility for the Samples 1 and 2 have an average rank order correlation of .54 ($p < .01$) and waking and hypnotic performance (Sample 1) has a correlation of .63 ($p < .01$). Thus waking suggestibility is by no means the only or even the major factor determining hypnotic behavior, and while it does have a certain predictive value in regard to the latter, this is far from perfect.

How closely can the performance of subjects who have not been formally hypnotized come to the best performance of hypnotized persons? In Sample 1 we found that two of our subjects scored 11 and 12 respectively out of the possible 17 points in the absence of any induction of hypnosis. This placed them in the 90th and 92nd percentile with respect to hypnotic performance. Several other subjects fell above the 80th percentile. Our Subsample 2 shows a similar but less impressive picture. Our results, in brief, demonstrate that *some individuals who have not been formally hypnotized can nevertheless exhibit behavior which can be produced by other individuals only after having been hypnotized.*

It is clear from Tables 1, 2 and 3 that not everyone who was tested showed a gain in suggestibility following the induction of hypnosis. Since a loss or gain of one point is not statistically significant, it is justifiable to pool individuals with a one point gain or loss with those showing no gain. When we do this for the Waking-Hypnosis group, Sample 1, we find that 57 per cent of the subjects showed for all practical purposes no gain in suggestibility following the induction of hypnosis. The remainder, or 43 per cent, showed definite gains, often appreciable (for instance, 17 per cent gained five or more points). How is gain related to initial waking

suggestibility? Of the 13 subjects who scored 0 or 1 in the waking state, and who hence were for all practical purposes refractory to suggestions, 54 per cent made significant gains (as many as eight points were gained). On the other hand, 65 per cent of the 17 subjects who scored 2 or more points in the waking state gained only one point or made no gain at all. As a matter of fact, a rho calculated for gain in hypnosis as a function of waking performance yielded a correlation of only .17 and is not significant. Thus hypnotic gain is not related to initial waking suggestibility.

Since a Wilcoxon matched-pairs signed-rank test shows the scores on the two waking runs in Sample 2 (Table 2) are not significantly different, it would appear that no practice effect or anything akin to heteroaction took place in this situtation.

A further comparison of interest can be made between the first waking run of Subsample 2 (Table 3) and the second waking run for these 14 subjects in Sample 2 (Table 2). Here again there is no statistically significant difference. Since between these two runs each subject had intervening experience with both the induction of hypnosis and hypnotic behavior, this suggests that such intervening experience has no appreciable influence upon subsequent waking performance when at least 24 hours have elapsed. We plan to test this hypothesis more fully at a later date.

DISCUSSION

The thought which lies behind our investigation is that if the induction of hypnosis has any significant effect upon the suggestibility of an individual, as is commonly believed and as Hull showed in a limited way, it should be possible to clearly demonstrate this effect over a wide range of suggestions. More specifically, if the induction of hypnosis increases suggestibility, then a hypnotized person ought to be able to go beyond the point at which he stopped in the waking state on a scale such as the 17-item scale used here. Furthermore, the increase should be above and beyond that due to other processes, *e.g.*, practice. We feel that the results of our investigation quite clearly support the above notion. While our findings are quite in keeping with those of Hull and his co-workers, they are also much more in agreement with the commonly held picture of the effects of hypnosis. That Hull *et al.* failed to observe as much change[10] is most probably due, as mentioned earlier, to the fact that in all but one study a single test, involving motor suggestions, was employed, and in the one investigation in which other test suggestions were employed, the results were too equivocal for Hull to feel justified in devoting more than a footnote to them. In addition, it may be remarked that these other suggestions belonged to the group of indirect suggestions (Progressive Lines, Progressive Weights, Warmth and Touch Illusion). These have been shown (9, 11) to be different in nature from the type of suggestions we used, the type usually employed when working with hypnosis; consequently one should not put too much weight on contrary findings based on indirect suggestions.

The absence of any practice-like effect in Sample 2 is in line with previous findings (6, 14) with regard to the constancy of susceptibility over repeated testing. This result is also congruent with Hull's (7) finding that apparently only the induction of hypnosis has a heteroactive influence. Since homoaction is concerned only with the influence of

[10] It is doubtful that our scale has the type of properties which would allow us to talk of per cent enhancement as Hull and his co-workers did (with no better justification) and to make quantitative comparisons between their data and ours. It is, however, our feeling that in general we observed behavior, and in particular, behavioral changes which seemed more in keeping with the classical picture of hypnosis than Hull did. We do know (6, 14) that postural sway suggestions are a relatively "easy" (Guttman sense) item in comparison to most of the items we used in testing our two samples. We therefore feel some justification in saying that we observed enhancement often "superior" to that observed by Hull *et al.*

response to a suggestion upon subsequent response to the same suggestion, the above result has no bearing on this effect. It ought to be remarked that there is a possibility that some kind of small practice effect which we could not statistically test did take place. The scores for both waking runs in Table 2 were obtained, like all other scores in the other tables, by counting only the number of items passed prior to failing three items in succession. In order to obtain additional information about the nature of the 17-point scale we did test all subjects beyond the failing point on the second (and last) run in the waking-waking situation (Table 2). As a consequence of this we know that 10 of the subjects did pass additional items (beyond the three consecutive failures). What we do not know is whether or not these represent actual gains. Had we taken these same subjects beyond the failing point in the first waking run they might or might not also have passed these additional items. It may be remarked, however, that even if we are dealing here with a gain, it would have raised the mean waking gain from .13 to only .53. This would not have affected our conclusion with regard to the unique effect of the induction of hypnosis since the hypnotic performance (run 2, Sample 1) remains significantly different from the waking performance (run 2, Sample 2) even when one includes the additional items in the scores of the subjects.

Alternatively, one could of course argue that giving the MMPI items inhibited any hypnotic-like effect which might have developed as a result of giving the first series of waking suggestions. This is conceivable, but rather unlikely. It is also possible, if it is real, that the small enhancement just referred to would represent a slight degree of hypnosis brought about by the first suggestion series. Technically speaking it would not be homoaction although of an order of magnitude consistent with it (11). The manner in which it is brought about would make it more like a heteroactive effect (11). If seen as a practice effect, it is clear that it would be a practice effect which involves a generalization of practice to suggestions which have not been previously responded to or to which the subject has not been exposed. In any event, the fact remains that *the formal induction of hypnosis had a significantly and appreciably greater effect.*

The interpretation of our results depends very much upon the assumption that our 17-item scale is a reasonably good Guttman-type scale; that is, that when a subject has failed to pass an item, the likelihood of his passing any later one is extremely small. As stated earlier, to take into account the fact that we certainly do not have a perfect scale of this type, we defined the end-point as three consecutive failures. On the basis of earlier work done with the scale items (6, 12–14), we had grounds for believing that when the scale is used in connection with an induction of hypnosis it is satisfactorily reliable and valid. We could not be certain, however, that the scale would retain its Guttman-type structure when used in the absence of an induction of hypnosis. In order to test this aspect we had all the subjects of our second sample go through the entire scale on the second run, regardless of where they failed. Examination of our results shows that in only seven cases would we have been in error of one item had we stopped testing after three consecutive failures in the second run. In only one case would our error have been as much as three items. Inasmuch as an error of one point is well within chance, out of 30 cases we would have made only one error that could count. That the scale has reliability can be seen from the fact that the rank order correlation between the two successive waking tests was .88 ($p < .001$). Further support for the reliability of the scale as we used it comes from a comparison of the scores made on the second of the waking runs in the Waking-Waking series with the scores made in the waking test which preceded the hypnosis test made later on the fourteen subjects who consti-

tuted Subsample 2. The means were 2.13 and 2.50 respectively. Wilcoxon matched-pairs signed-rank test shows there is no significant difference between these two sets of waking scores. Similarly we would call attention to the closeness of the results obtained on the effects of hypnosis on the two samples. Sample 1 scored a mean of 4.83 as against a mean of 4.92 for Subsample 2 following the induction of hypnosis. The mean hypnotic gain for Sample 1 was 2.15 as against 2.43 for Subsample 2. Statistical tests show the differences between samples are not significant.

It is our opinion therefore that the formal induction of hypnosis which we used had a unique enhancing effect upon the suggestibility of many subjects. The fact that waking performance, Sample 1, has a rank order correlation of only .48 with susceptibility and of .63 with hypnotic performance on the 17-point scale strongly suggests that something else besides waking suggestibility enters the determination of hypnotic behavior. In this connection it is rather striking that some individuals who scored zero (refractory) in the waking situation responded rather well following hypnotization. In addition, even individuals who produced waking behavior of the same quality shown by good somnambulistic subjects delivered a superior performance when hypnotized.

Just what that something is that is introduced by the induction of hypnosis can only be speculated about. It certainly could be the rather elusive state which has been called "hypnosis," or what Orne (8) refers to as the "essence" of hypnotic behavior. The present investigation gives strong support to the theory that the induction of hypnosis brings about a change in the state of the individual which is subsequently reflected in his behavior with respect to suggestions. We certainly have not fully settled the matter. What we have demonstrated is that on at least one widely accepted "dimension" of hypnotic behavior the use of a widely accepted method of "inducing hypnosis" can make an appreciable difference in the type of behavior one can elicit from individuals, so much so that we feel justified in stating that *in addition to being normally more or less suggestible, following an induction of hypnosis individuals fall into two classes, those who show an increase in suggestibility and those who do not.*[11] If we are going to talk about individuals *who are hypnotized* and those who are not, this fact needs to be taken into account. There is probably no unique interpretation or way of utilizing this observation. One of the most crucial questions which comes up in any study of hypnotic phenomena is: When can one state that a person is "hypnotized?" Hull (7) made a further remark in connection with the question of hypnotic hypersuggestibility which seems particularly relevant here. "*It is particularly to be noted, however,*" he remarks, "*that the hypnotic hypersuggestibility revealed by the experiments has not an absolute, but only a relative, significance.* While most persons actually are more suggestible in the hypnotic trance than when they are in the non-trance condition, it does not follow by any means that all persons in hypnosis are more suggestible than any person in the normal condition" (7, p. 331). We would add that it does not follow by any means that any person showing a high degree of suggestibility is hypnotized, and conversely that a low suggestibility is necessarily a sign that hypnosis is not present. Our results suggest that at least part of the answer, if not the whole answer, to the question of when is a person hypnotized may be found in the demonstration that a *significant increase* in suggestibility has taken place following the exposure of the subject to whatever conditions or agents one is studying or using. The results of our investigation further suggest, if one

[11] It should be clear that our findings can be equally well stated in terms of existing alternate theoretical views on hypnotic behavior. Thus, we could just as easily speak here in terms of enhanced role-taking capacity, increased propensity toward role-taking, etc. We do happen, however, to favor the notion of suggestibility.

takes this position, that, using our 17-item scale, passing three or more items beyond those passed in the waking state would be acceptable evidence that a person is hypnotized.

The use of this criterion is not entirely without possible drawbacks. It is conceivable that some individuals spontaneously enter a hypnotic state whenever their suggestibility is tested. Such people might then have a spuriously high base line when tested in the "waking" (but actually hypnotic) state and show no enhancement following an induction of hypnosis. It is also conceivable that there exists a third class of individuals who can be hypnotized but who show little or no increase in suggestibility. For, if one of the things an induction of hypnosis does is to increase already existing suggestibility, it would seem reasonable to expect that the closer an individual was in his waking state to his absolute limit with regard to responsiveness to suggestion, the less increase one might expect to observe following hypnotization, and in fact, in the limiting case, there would be no observable enhancement. If there is more to hypnosis than enhancement of suggestibility, such individuals could be hypnotized in spite of our criterion indicating the contrary. Thus there are at least two ways in which the use of the proposed criterion could give rise to false negatives. Of course we do not know that either of the above situations ever arises, but they certainly are possibilities. Such eventualities might account for the fact that five of the 30 subjects tested in Sample 1 showed no change in suggestibility in spite of the fact that their susceptibility scores, which ranged from 7 to 10, would have led us to expect them to be medium to deep hypnotic subjects.

In this line of thinking, we also recognize the fact that while there exist situations in which a formal induction of hypnosis definitely seems to bring about certain obvious changes in the subject; the latter may not only show no increase in suggestibility, but as a result, such degree of overt responsiveness as may have been present prior to induction seems even reduced. Such individuals may develop in a striking manner a cataleptic-like immobility, or a high degree of passive compliance. These individuals may subsequently report subjective experiences which are consistent with having been hypnotized and they may themselves assert a feeling that they were hypnotized. How are we to classify such individuals? Perhaps they are atypical cases or artifacts. It is known that in some cases such suggestions as those to become relaxed, or to sleep, which are often a part of the formal induction of hypnosis, bring about prepotent responses which subsequently interfere with the elicitation of overt activity which is not consistent with being relaxed or asleep (10). Or it may be that one must distinguish between the production of a variety of "trance states" and "hypnosis" where hypnosis is a trance state "plus" something else, such as readiness to unqualifiably accept any statements of the hypnotist and act upon them. Barber (2) has proposed something of the sort. Historically, the notion of more than one kind of hypnosis has found its way in the literature on more than one occasion (10).

In the light of all these considerations it behooves us not to be too hasty in deciding upon a criterion for when hypnosis is or is not present. At the present stage of our knowledge about hypnotic phenomena it might be premature to insist that one define hypnosis as being present if and only if hypersuggestibility can be shown to have developed. We have shown this to be the case only for one particular formal induction and we can only infer that this would have still been the case had we used a variety of other recognized induction techniques. We are therefore inclined to recommend that our criterion be considered as sufficient primarily *in the absence of any other adequate evidence of hypnosis or in cases of doubt.* Whether it should be a necessary criterion

must be left for future developments to decide. It does concur with the classical picture of hypnosis and to a large degree with the current picture of this phenomenon; its wide use would greatly insure that when we talk about hypnosis, not only are we still talking about the same set of phenomena as were once labeled "hypnotic," but we are also talking about the same set of phenomena among ourselves. In any case, in critical studies of hypnotic behavior one ought to know whether or not the suggestibility of an individual becomes enhanced when he is hypnotized; for the presence or absence of such an enhancement may well be just as characteristic of his hypnotic behavior as is his ability or inability to respond adequately to some particular suggestion, and in particular to those contained in the induction procedures. The use of this criterion might, for instance, be very useful in clarifying the issue of whether or not certain drugs bring about a hypnotic state comparable to that brought about by accepted techniques of induction, such as the one we used. Very briefly this could be done by establishing that subjects *who are known to show enhanced suggestibility* following such an accepted procedure do or do not show an enhancement or show a significantly different amount of enhancement than with the reference induction. Another interesting and practical application might be to determine whether the ability to develop good hypnoanesthesia has any relationship to the ability to show enhanced suggestibility following an induction of hypnosis.

It may not be necessary in non-critical studies to go through as elaborate a testing procedure as we have done in order to select subjects who will develop enhanced suggestibility and those who will not. There is evidence that this can be done reasonably well using only the score obtained on the Stanford Hypnotic Susceptibility Scale. If one examines Table 1, one finds that no subject who scored six points or less on it made any significant gain following the induction of hypnosis. In all there were 14 such subjects. Of the remainder, 11 scored seven or more points on the scale and gained three or more points after induction. That leaves five who were the dubious cases discussed earlier, and who made no significant gain in spite of having a susceptibility score of seven or better. This suggests that using this scale alone, one can select most of the subjects whose suggestibility will not be affected by a formal induction of hypnosis and most of those whose suggestibility will be affected. The first group are those making scores from 0 to 6, the second group are those making scores from 7 to 12. In Sample 1 no person scoring in the range from 0 to 6 made a significant gain, and in this sense, this range would appear to be free of errors. We do, however, expect that in general some errors will also occur in this range, and the fact that the results of Subsample 2 (Table 3) show three occurrences of significant gain made by individuals with susceptibility scores below 6 may be in line with this expectation. This can not be considered conclusive evidence, however, since Sample 1 and Subsample 2 were treated differently with regard to prior exposure to the induction and utilization of hypnosis. Even though this does not appear to have influenced waking performance, it still could have had a selective effect upon hypnotic performance for some individuals. In any case, if these are true errors they are small enough in number to justify our considering the Stanford Hypnotic Susceptibility Scale as usable for the purpose of selecting individuals most likely and least likely to be affected by a formal induction of hypnosis.

It will be noted that in the above discussion we have favored the notion that a formal induction of hypnosis brings about a specific change in the individual. Alternatively one could argue that all the induction did was to deepen an already existing state of hypnosis. This condition could either have been brought about by the sequence of waking suggestions previously given, or

might be a natural concomitant of responding to suggestions. If so, it still remains that the induction has a singular and rather *unique* property of "deepening" hypnosis or enhancing the response to suggestions in only certain individuals and not others, and such an effect seems to us to imply a change in the state of the individual.

One of the striking findings in this investigation was the degree to which some individuals can produce hypnotic-like behavior in the absence of any formal induction of hypnosis. A number of our subjects produced behavior of this kind, comparable to the performance of so-called deep or somnambulistic subjects: were these individuals in a hypnotic state which had occurred spontaneously or was self-induced, or perhaps was brought about in these instances by the very act of responding to one or more of the test suggestions? In two cases at least, it was the impression of the examiner that the subjects were indeed hypnotized. There seems to be a general typical mien which is on the whole characteristic of hypnotized persons which, although difficult to describe, serves rather well to experienced hypnotists as a basis upon which to make this appraisal. In any case we made a point of asking each subject at the end of each session after they were no longer under the influence of any suggestion and fully dehypnotized, and subsequently while under hypnosis, to tell us whether they felt they were hypnotized while carrying out what were presumably waking suggestions; and we also tried to get at the basis of such discriminations as they made between their states in the various situations. We found that most subjects could clearly distinguish between being and not being hypnotized on one basis or another. One of the most interesting and perhaps significant distinctions our best waking performers made between carrying out waking and hypnotic suggestions was that in the first case they had to "work" very hard in order to bring about the desired results, whereas once hypnotized they had to do nothing—instead it was the hypnotist "who did all the work." What they mean by "work" here appears to have been a matter of concentration upon the suggestions and instructions. This is interesting in view of the fact that concentration of attention has often been considered an important factor (even the main and only factor) in the production of hypnosis, which has then been seen as a state of intense concentration on an idea or group of ideas (11). Another interesting aspect of the nature of the "work" was that in a number of cases the subject described himself as concentrating on the repetition to himself over and over of the suggestions, as one presumably does in autosuggestion. This is of some interest, since it is sometimes theorized that all of hypnosis is really a matter of self-suggestion and self-hypnosis. It is, however, important to note that one of the clearest statements given to us by one extremely good waking subject of the difference between carrying out suggestions in the two situations was that in the waking state she had to do all the work of concentrating upon the suggested ideas, which concentration involved the voluntary repeating over and over of the words; whereas when hypnotized, *she did nothing*; it was now the hypnotist who did all the work, *who concentrated for her*. Other subjects have made similar statements. If this is so, then it would appear that perhaps true waking responses to suggestions are autosuggestive in nature, but that this is not necessarily the case for hypnotic responses. It is possible that all these subjective differences are themselves suggested artifacts. After all, many kinds of things are implicitly suggested when one tells a person, "I am now going to hypnotize you." Certainly this must evoke in the mind of the subject more or less vague notions of some changes to be experienced. That they should then experience a change is not particularly surprising.

We have shown that the induction of hypnosis has a characteristic effect: what

specific element or elements in it are responsible has not been established. Nor have we determined how the procedure or the crucial elements bring this effect about. In a private communication to one of us, Dr. Martin T. Orne has proposed that what is important here is not the procedure used *per se*, but whether or not it is perceived by the subject as a "legitimization" to exhibit hypnotic behavior. According to this view any procedure, event or situation thus perceived would lead to hypnotic behavior. This is an interesting possibility, but one which must remain for a time a matter of speculation. In any event it must be emphasized that the present investigation was not aimed at ascertaining what specific factors brought about hypnotic behavior or a change in state, but whether in the first place such a change did take place under certain conditions. It must also be recognized that we have only dealt with one feature of hypnotic behavior, responsiveness to suggestions (or suggestibility), and even at that we have been prone to emphasize certain aspects of this responsiveness much more than others (12, 13). It is conceivable that our observations would not hold for other dimensions of hypnotic behavior which may exist. Nor do we necessarily expect our findings to be applicable to other kinds of suggestions such as those said to be associated with secondary suggestibility. We have dealt with but one aspect, the one which historically and to this day has been and remains the most directly and empirically accessible, and the most characteristic of hypnosis.

SUMMARY

The comparative responsiveness to suggestions of two groups of subjects totalling 60 has been studied in an effort to ascertain whether or not a formal induction of hypnosis has a specific enhancing influence upon suggestibility over a broad spectrum of response. For this purpose a special scale of responsiveness to suggestions was constructed and used. The results indicate that, when an induction of hypnosis is employed, some individuals show an appreciable change in suggestibility which is compatible with the notion long held that a change in state is brought about. This effect has a relatively low correlation with responsiveness to suggestion in the absence of an induction of hypnosis, a fact which strongly suggests the above is a unique property of the induction procedure. It is proposed that until a better criterion is found, the demonstration of a significant increase in suggestibility following a formal induction of hypnosis *might* be used in deciding whether or not a person has been hypnotized, and would in any case help in communicating intelligently about hypnotic phenomena. There is evidence that the Stanford Hypnotic Susceptibility Scale can be directly used to select individuals who are and who are not affected by the induction procedure without having to resort to a pre-test of "waking" suggestibility.

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SCHIZOPHRENIA: CORRELATES OF LIFE HISTORY

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This report presents data in support of a previous paper (18) which proposed that, for advantages in research and theory, schizophrenic persons, instead of being categorized into a unitary diagnosis, can be described as varying in their degree of pathology according to the degree of social maturity attained before their breakdown. It was further proposed that the degree to which early development has been deficient predicts the severity and prognosis of the schizophrenic disorder, with the earlier and more extreme deprivations being associated with the more malignant manifestations while the later and milder deprivations result in a comparatively benign pattern.

As an empirical test of this proposal, it is hypothesized that the most pathogenic familial environment (measured by biographical data) and the poorest cognitive functioning (measured by the most regressed Rorschach performance and the most disordered psychiatric symptomatology) distinguish the malignant pole of schizophrenia, as differentiated from the benign pole of schizophrenia which is associated with the comparatively least pathogenic familial environment, and the relatively highest cognitive functioning.

PROCEDURE

The variables and their measures as used in this study, are summarized in Table 1.

Ratings of pathogenicity of environment during development: The purpose was to characterize each patient's development. Rating A summarized the information about the significant social environment, and Rating B summarized the information on the patient's responses to the social environment during development. Essentially, these ratings were graphic scales with five defined points. On each, a patient could be assigned a number from 0 to 4 inclusive. The defined points were epochs of development following Sullivan (37), *i.e.*, infancy, childhood, juvenile, preadolescence, and adolescence and later.

The history of each patient, as obtained and recorded by regular social service procedures, was the basis for this rating. In rating each history, each rater had in mind the literature dealing with the life histories of schizophrenics (*e.g.*, 2, 3, 5, 6, 8–11, 14, 16, 20, 21–25, 28–32, 35, 38, 42, 46). This literature suggests that in the backgrounds of schizophrenics, certain events have occurred with unusual frequency and intensity. Examples are a severely neurotic parent, a psychotic parent, excessive emotional turmoil within the family, early death of the mother, the child degraded and devalued, symbiotic overprotection, severe marital discord, severe physical punishment of the child, father dominated and ineffectual, and mother domineering and cold. In general, schizophrenics, as children seem to have suffered extreme lack of (a) adequate models, (b) appropriate amounts of warmth (affection, love), and (c) reasoned discipline. The judges who made the ratings for the present study had the necessary detailed knowledge of this literature.

Rating A: If at any point in development the history gave evidence that pathogenic factors had occurred without ameliorating counter-forces, the case was rated as having encountered a pathogenic environment of persons at whatever epoch was indicated by the history. The earliest epoch during which

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TABLE 1
Summary of Variables and Measures

I. Variable I: Pathogenicity of the environment for the person during his development
  A. Measured by case-history data
    1. Rating A: graphic rating scale of family disorganization, in terms of the earliest epoch (Sullivan's term) during which the family setting became pathogenic.
    2. Rating B: graphic rating scale of personal maladjustment in terms of the earliest period in which deviant behavior of the patient was reported.
II. Variable II: Cognitive Functioning
  A. Measured by functioning of perceptual processes
    1. Rating C: graphic rating scale of Rorschach age-level.
    2. Rating D: graphic rating scale of Rorschach pathology.
  B. Measured by symptom disorder
    1. Rating E: graphic rating scale of the disorganization of the patient's communications.

a pathogenic situation seems to have existed was taken as the basis for predicting the severity of schizophrenic manifestations. Note that the rating is the basis, not for predicting the presence or absence of schizophrenic breakdown, but for predicting severity of manifestations if breakdown has occurred. For each patient, then, there was an age-level rating of pathology of the environment of persons.

Rating B: This rating, made from the social service history also, was of the epoch at which significant maladjustment became apparent. Particular attention was given to aspects of adjustment such as those described in the Elgin Prognostic Scale (40–44) and those sections of the Phillips Prognostic Scale (28) having to do with social relationships and friendships. It should be noted that weight was given to severe acting-out tendencies, behavior problems, and delinquency (26). Knowledge of the literature on premorbid adjustment of schizophrenics was required of the judges in this study and would be necessary for other judges making such ratings.

Ratings A and B were made at different times, but from the same social service histories, and were combined as the best available estimate of the degree of pathogenicity of the developmental environment.

Assessments of cognitive functioning: The theoretical point of view espoused (13, 18, 33) proposes that the self-image of any person is most strongly shaped when he is frustrated, threatened, or hurt by the significant early intimates of his life. For the person who has had pathogenic circumstances of living, and who has become psychotic, the characteristic modes of cognitive-perceptual functioning will be those which have been predominant when highly salient aspects of the self-image were formed. Hence, the assumption that the earlier the occurrence of pathological threat and stress in the developmental years of the subject, the more immature will be his cognitive functioning, measured here by his Rorschach performance and by his psychiatric symptoms (as evidence of the organization of his cognitive processes).

Rating C (Rorschach age-level): The point of view guiding this investigation suggests that the modes of cognitive functioning reflected in the Rorschach performances of adult schizophrenics will be similar to the modes found in the Rorschach performances of normal children of various ages. (It is obvious that there are many differences in content and in the detail of verbal behavior.) The Rorschach of each patient in this study was rated as to developmental epoch on the basis of similarity of formal qualities to those found to be characteristic of the Rorschachs of samples of normal children at successive age levels (39). Other investigators have successfully rated Rorschach performance in very similar ways (4, 12, 15, 27, 34, 45). For the present study, the Rorschach of each patient was scored according to the conventions of Klopfer and Kelley (19), and was matched with Rorschach norms of children, taking into account all aspects of the performance. The required detail

acquaintance with the literature on children's Rorschach performance is possessed by both judges in this study. A graphic rating scale with five defined points (the epochs of development mentioned above) was employed.

Rating D (Rating of pathology following Klopfer and Kelley): The second approach in rating the Rorschach records was to use the discussion by Klopfer and Kelley (17, 19) as the guide for making a global rating of severity of psychopathology for each Rorschach protocol. This was a relative rating in terms of a 5-point graphic rating scale. One pole was defined as minimal evidence of pathology. The other pole was extreme severity of pathology, observed in no more than one in 20 schizophrenic patients. The midpoint was that extent of pathology found in the records of typical schizophrenic patients. Extensive experience in the use of the Rorschach as a tool in psychodiagnosis was a necessary part of the training of the clinical psychologists who made these judgments.

Rating E (Rating of symptoms as communications): In line with the views of such authors as Arieti (1), Sullivan (36, 37) and Cameron (7), severity of the psychotic disorganization can be inferred on the basis of the extent to which the patient's communications about himself and his problems fail to conform to the socially accepted symbols of the culture. The judges rated the verbalizations, as reported in the psychiatric summary, on a 5-point scale for adequacy of communications about self in relationship to the current interpersonal situation. In so far as possible, ratings were based on quotations from the patient. Statements in the previous paper (18) on the various levels of schizophrenic integrations served to define the points on this graphic rating scale. These levels ranging from babyhood through adolescence were characterized by the terms infantile-empathic, prototaxic, parataxic, autistic, and syntaxic and parallel the 5-point graphic rating scales used previously.

Sample: The sample selected for this study consisted of all patients at a fourteen hundred bed Veterans Administration hospital who had been diagnosed as schizophrenic and who had been given the Rorschach during a period of eighteen months. The period of time chosen was the interval between January 1, 1948, and July 1, 1949. The basic reason for this choice was that there were at the time in the hospital a reasonable number of veterans with comparatively recent war experiences and with normal pre-war personalities. A sample chosen at a later date would tend to be heavily weighted with malignant schizophrenics. An earlier post-war period, say 1946 or 1947, was not selected because a full complement of qualified psychologists, psychiatrists, and social workers was not achieved by the hospital until 1948.

Diagnostic formulation and judges' ratings: The diagnosis of schizophrenia had been made by the psychiatrist in charge of each case only after careful study of the patient and with the concurrence of a highly qualified chief of psychiatry.

The five ratings, described above, were made by the authors, independently. Each judge rated all cases on each variable before proceeding to the next variable. This number of ratings and the limited time of the judges combined to extend the work over a period of many months. The large number of cases rated, the randomization of their order, and the extended period of time over which the work was done, seems to minimize the likelihood that memory contaminated the ratings.

The materials used as the basis for the ratings were collected in the usual manner, with communication among the psychiatrist, psychologist, and social worker regarding a typical case, as the case was being studied. It is impossible to determine the extent to which such contacts tended to introduce congruence in the perceptions of the patients among those who recorded the information used as the basis of the present ratings.

RESULTS

Agreement between judges: The extent of agreement between the two raters was determined for each of the five ratings by calculating the product-moment correlation between the two sets of ratings. These are presented in Table 2.

In Table 2, "total pathogenicity" refers to the combined ratings made from the case histories, *i.e.*, Ratings A and B. While a high correlation would be expected on theoretical grounds, the more compelling reasons for combining these ratings were: (a) Ratings A and B were made from the same source material, and (b) Rating A for the two judges combined correlated .85 with Rating B for the two judges combined. Thus, in assessing the predictions, Total Pathogenicity was taken as the measure of the nature of the developmental environment.

Predicted correlations between variables: Since the inter-judge agreements are satisfactory, the predicted relationships among variables are studied in terms of the combined ratings of judges A and B, for each variable. It was predicted that pathogenicity of the environment of persons during development would be correlated with cognitive functioning as measured by the Rorschach and the communications about self. These results are presented in Table 3.

TABLE 2

Reliabilities of Ratings (Product-moment)

Variable	r	N*
Rating A (pathogenic environment of persons)	0.88	233
Rating B (premorbid maladjustment)	0.89	233
Rating A + Rating B (total pathogenicity)	0.88	233
Rating C (Rorschach age-level rating)	0.92	230
Rating D (Rorschach pathology rating based on Klopfer-Kelley)	0.89	230
Rating E (adequacy of communication about self)	0.87	237

* N varies because of the occasional lack of relevant data on which judges could make the ratings.

TABLE 3

Correlation of Total Pathogenicity with Other Variables

Variable	r*	N
Rorschach age-level rating	0.70	210
Rorschach pathology rating (Klopfer-Kelley)	0.74	210
Adequacy of communication about self	0.76	217

* For all three correlations, $p < .001$.

DISCUSSION

The study of the developmental history of these patients was retrospective, and informants may have been influenced in unknown ways by knowledge that there was severe maladjustment of the subjects. This difficulty is present in almost all clinical studies. In the present study, the emphasis was on differences *within* the patient group, so the disadvantages of the retrospective method may not be so serious as when the comparison is of normals with patient groups.

The results are in keeping with the general psychodynamic position that pathogenic events during the development will be related to adult maladjustment. Predictions were of degree of disorganization or disturbance as a function of the timing of severe pathogenic events during development. Disorganization was assessed in terms of cognitive functioning.

It is concluded that the results of this study lend support to the theoretical position proposed in a previous paper (18).

SUMMARY

A formulation (18) which proceeds largely from Sullivan's self-theory suggested that severity of schizophrenic manifestations would be related to the developmental epoch at which the circumstances of living became extremely deviant. As was predicted, pathogenicity of the environment of persons during development was correlated with manifestations during the adult psychotic episode, *i.e.*, with (a) Rorschach age-level,

(b) Rorschach pathology rating, and (c) symptom pathology ratings. Inter-judge agreement on all ratings was high. The sample was 238 schizophrenic patients studied at a Veterans Administration hospital.

The results reported are interpreted as empirical support for the position that schizophrenia is a set of plural states (ranging from benign to malignant), rather than a unitary state which can be handled as a homogeneous whole in study and experiment.

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CHANGES IN PATTERNS OF INTELLIGENCE TEST PERFORMANCE ASSOCIATED WITH HOMONYMOUS VISUAL FIELD DEFECTS

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In cases of homonymous visual field defects where the presence of organic brain damage has been established on the basis of other pathological criteria, it is highly probable that the brain lesion will include a portion of the temporal lobe or the occipital lobe, or both (3). Left homonymous visual field defects tend to be associated with lesions in the temporal-occipital region of the right hemisphere, and right homonymous visual field defects tend to be associated with lesions in the corresponding region of the left hemisphere. Such lesions could have two kinds of effect on intellectual abilities. First, the performance of many activities involving vision may be directly impaired by the presence of homonymous field defects in either the left or the right visual field. Second, there may be some impairment of the abilities subserved by the cortical area in which the lesion occurred. In the latter case, a differential change in abilities might be expected to occur as a function of which visual field was impaired. Left homonymous visual field defects should be associated with decrements in abilities subserved by the right hemisphere, and right homonymous field defects should be associated with decrements in abilities subserved by the left hemisphere.

The present study involved a comparison of the intelligence test performance of a group of brain-damaged patients with right homonymous visual field defects, a group of brain-damaged patients with left homonymous visual field defects, a group of brain-damaged patients without visual field defects and a control group with neither brain damage nor visual field defects. The intelligence test used in this study, the Wechsler-Bellevue Intelligence Scale (10), is made up of eleven subtests, six of which were designed to measure verbal abilities and five of which were designed to measure nonverbal abilities. The occurrence of differential impairment of performance on this test as a function of the visual field that was impaired would constitute an objective demonstration that patients with right homonymous visual field defects can be expected to exhibit a different type of intellectual deficit than patients with left homonymous visual field defects. Such a finding would also provide additional evidence that different types of abilities are subserved by corresponding areas in the two cerebral hemispheres. Finally, both groups of patients with visual field defects might be expected to perform poorly on those subtests of the Wechsler Scale that involve complex visual perception. The occurrence of impaired performance on certain subtests by both groups with visual field defects, as compared with the other two groups, would, therefore, suggest that the specific abilities involved in those particular subtests require intact visual fields.

METHOD

The subjects used in this study were selected from a larger number tested at the Neuropsychology Laboratory of the Indiana University Medical Center during the period 1951–1959. Each of the four groups contained 19 subjects, and the groups were matched as exactly as possible on the basis of age and education, as shown in Table 1. The diagnosis of brain damage was based upon a

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TABLE 1

Mean and Standard Deviation (SD) of Age and Education for Each Group

Group	N	Age Mean	SD (yrs.)	Education Mean	SD (yrs.)
Right homonymous visual field defects	19	39.37	13.86	11.16	3.27
Left homonymous visual field defects	19	36.42	16.82	11.32	3.04
Brain damaged without visual field defects	19	39.37	15.72	10.53	3.19
Control	19	40.47	9.34	11.16	2.84

complete neurological examination and upon one or more of the following diagnostic procedures: pertinent anamnestic information, electroencephalography, skull X-rays, angiography, pneumoencephalography, neurosurgical findings, and autopsy.

Visual fields were examined by gross confrontation procedures during the neurological workup by more than one neurologist in each instance. In most instances agreement with respect to the presence or absence of homonymous visual field defects occurred. In those instances in which disagreement occurred the patients included in the study had been referred for more complete examination by the Department of Ophthalmology, and results of this examination were then used for classification. Each patient had also been examined for visual inattention (or extinction) in perception of bilateral simultaneous visual stimulation in an effort to avoid confusing this phenomenon with a primary visual field defect. While data from these sources were used for composing the groups, the actual selection was made on the basis of a retrospective review of all findings for each patient especially for this study by Dr. John Kalsbeck, to whom we wish to express our appreciation. In this way the groups were composed according to information relating to the visual fields, but in complete separation from the psychological test results.

The two groups of brain-damaged patients with visual field defects and the group of brain-damaged patients without visual field defects were fairly well matched with respect to type of brain lesion. The group of brain-damaged patients with right homonymous visual field defects included seven patients with intrinsic cerebral tumors, three with cerebral vascular disease, four with traumatic head injury, two with intracerebral hematoma, one with a pituitary tumor, one with syphilis of the central nervous system, and one with cerebral damage secondary to carbon monoxide exposure. For 16 of these patients the left hemisphere was primarily involved and the remaining three patients exhibited bilateral dysfunction. The group of brain-damaged patients with left homonymous visual field defects included eight patients with intrinsic cerebral tumors, four with cerebral vascular disease, two with traumatic head injuries, one with a cystic cerebral lesion, one with subarachnoid hemorrhage, one with a pituitary tumor, one with an intraventricular meningioma, and one with a cerebral lesion secondary to chronic mastoiditis. For 18 of these patients the right hemisphere was primarily involved and for the remaining patient both hemispheres. The group of brain-damaged patients without visual field defects included seven patients with intrinsic cerebral tumors, three with cerebral vascular disease, four with traumatic head injuries, two with cerebral abscess, one with intracerebral hematoma, one with a cystic cerebral lesion, and one with cortical atrophy. For 11 of these patients, the right hemisphere was primarily involved, for six of the patients, the left hemisphere was primarily involved, and for the remaining two patients, both hemispheres. The control group included five patients with affective disturbances, three paraplegics, four hospitalized patients with miscellaneous complaints not involving the central nervous system, and seven nonhospitalized individuals. This group was purposely selected to include hos-

pitalized patients, patients with chronic illness, and patients with affective disturbances, since these factors would presumably be operative in the brain-damaged groups. Such a control group would, if anything, tend to obtain lower average scores on the intelligence scale than would a group composed entirely of normal nonhospitalized control subjects.

RESULTS

Several measures of IQ can be derived from Wechsler-Bellevue scores. Full-Scale IQ is based upon the total score, Verbal IQ is based upon the score achieved on the verbal subtests, and Performance IQ is based upon the score achieved on the nonverbal, or performance subtests. In each case, the individual subtest scores are weighted in accordance with test norms. Figure 1 shows the mean level of Full-Scale IQ, Verbal IQ and Performance IQ for each of the four groups, and Figure 2 shows the mean weighted score obtained by each group on each of the 11 subtests. The statistical significance of differences among group means for each of the group comparisons shown in Figures 1 and 2 was determined by analysis of variance (9). Where a significant amount of variability among group means was demonstrated by analysis of variance, further analysis was made by the New Multiple Range Test (2) to determine the statistical significance of differences between each pair of group means.

Each of the analyses of variance resulted in an F-ratio statistically significant beyond the .01 level of confidence. This demonstrated that there was a significant amount of variability among the group means for each of the IQ measures and on each of the 11 subtests. Therefore, all of the mean scores were further analyzed by the New Multiple Range Test. Table 2 shows the results of these analyses expressed in terms of the levels of statistical significance of differences between group means, where each group has been compared with each of the other groups. Examination of Figure 1 and Table 2 shows that the control group exceeded the

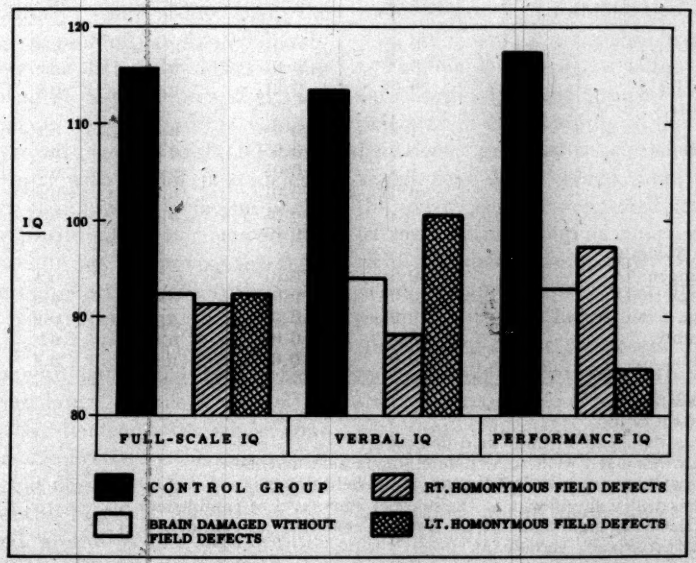

FIG. 1. Mean Full-Scale IQ, Verbal IQ, and Performance IQ attained by each group on the Wechsler-Bellevue Intelligence Scale.

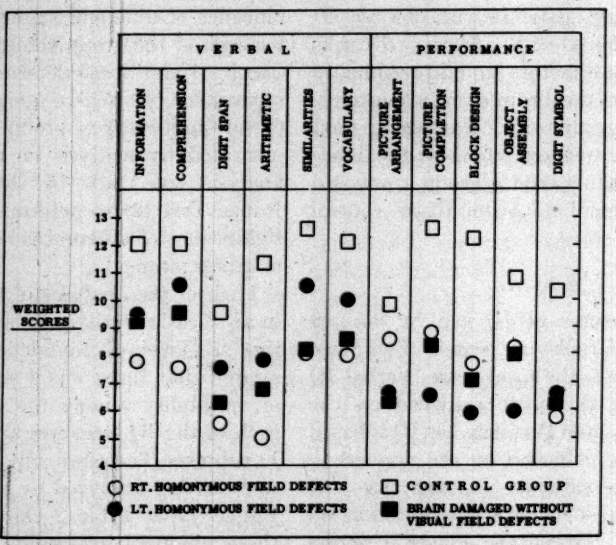

FIG. 2. Mean weighted scores achieved by each group on the six Verbal subtests and the five Performance subtests of the Wechsler-Bellevue Intelligence Scale.

TABLE 2

Levels of Statistical Significance of Differences Between Groups

Score	C—R	C—L	C—BD	BD—R	BD—L	L—R
Full-Scale IQ	0.01	0.01	0.01	n.s.	n.s.	n.s.
Verbal IQ	0.01	0.05	0.01	n.s.	n.s.	0.01
Performance IQ	0.01	0.01	0.01	n.s.	n.s.	0.05
Verbal Subtests:						
Information	0.01	n.s.	0.05	n.s.	n.s.	n.s.
Comprehension	0.01	n.s.	0.05	n.s.	n.s.	0.01
Digit Span	0.01	n.s.	0.05	n.s.	n.s.	n.s.
Arithmetic	0.01	0.05	0.01	n.s.	n.s.	0.05
Similarities	0.01	n.s.	0.01	n.s.	n.s.	n.s.
Vocabulary	0.01	n.s.	0.05	n.s.	n.s.	n.s.
Performance Subtests:						
Picture Arrangement	n.s.	0.01	0.01	0.05	n.s.	0.05
Picture Completion	0.01	0.01	0.01	n.s.	n.s.	0.05
Block Design	0.01	0.01	0.01	n.s.	n.s.	n.s.
Object Assembly	0.05	0.01	0.05	n.s.	n.s.	n.s.
Digit Symbol	0.01	0.01	0.01	n.s.	n.s.	n.s.

Key to Symbols:

C = control group
BD = brain-damaged without field defects
R = brain-damaged with right homonymous field defects
L = brain-damaged with left homonymous field defects
.01 = statistically significant at the one per cent level of confidence
.05 = statistically significant at the five per cent level of confidence
n.s. = not statistically significant

three brain-damaged groups by a significant amount on all three of the IQ measures. The brain-damaged groups with visual field defects did not differ significantly from the brain-damaged group without visual field defects on any of the IQ measures, nor did the groups with visual field defects differ significantly from each other with respect to Full-Scale IQ. However, the group with right homonymous field defects was significantly lower than the group with left homonymous field defects in Verbal IQ, and the group with left field defects was significantly lower than the group with right field defects in Performance IQ.

The impairment in verbal abilities of the group with right homonymous visual field defects is further indicated by the analysis of Verbal subtest scores. The right field defect group achieved the lowest mean weighted score among the four groups on each of the six Verbal subtests, although the differences were quite small in several cases, as shown in Figure 2. Table 2 shows that both the right field defect group and the brain-damaged group without field defects made significantly lower scores than the control group on each of the six verbal subtests, whereas the left field defect group made significantly lower scores than the control group on only one verbal subtest. As was the case with respect to the IQ measures, the groups with visual field defects did not differ significantly from the brain-damaged group without field defects on any of the Verbal subtests. However, the right field defect group scored significantly lower than the left field defect group on two of the Verbal subtests.

The group with left visual field defects tended to score lowest on the Performance subtests, but this tendency was not as consistent as that manifested by the group with right visual field defects on the Verbal subtests, as shown by Figure 2. All three of the brain-damaged groups scored significantly lower than the control group on all of the Performance subtests except the Picture Arrangement subtest, where the right field defect group did not differ significantly from the control group. The two groups with visual field defects differed significantly from the brain-damaged group without field defects only on the Picture Arrangement subtest, where the right field defect group scored significantly higher than the group without field defects. On three of the five Performance subtests the left field defect group made significantly lower scores than the right field defect group, thus providing a further indication that the group with left visual field defects was particularly impaired in nonverbal abilities as compared with the right field defect group.

DISCUSSION

The most striking difference in intelligence test performance among the four groups was the superiority of the control group to the three brain-damaged groups. Since the groups were comparable in age and education, this large difference in intelligence level probably reflects the general impairment of intellectual ability that tends to be associated with any sizeable brain lesion.

The major differences noted among the three brain-damaged groups were the impairment in verbal ability of the right visual field defect group as compared with the left visual field defect group, and, conversely, the impairment in nonverbal ability of the left field defect group as compared with the right field defect group. Since the right field defect group was composed principally of patients with left hemisphere damage and the left field defect group was composed almost entirely of patients with right hemisphere damage, these results are in accord with results obtained in studies by Anderson (1), McFie and Piercy (6), and Reitan (7), all of whom found that patients with left hemisphere lesions made lower scores than patients with right hemisphere lesions on the Verbal subtests, and that patients with right

hemisphere lesions made lower scores than patients with left hemisphere lesions on the Performance subtests.

Similar results have also been obtained in studies where groups were composed according to other criteria relating to lateralization of brain damage. Kløve and Reitan (5) found differences in Verbal and Performance IQ similar to the findings of this study in an investigation wherein one group was selected on the basis of specific losses in language function and the other group was selected on the basis of difficulties in dealing with spatial configurations; and Kløve (4) obtained similar results in comparing a group with EEG abnormality maximized over the right hemisphere to a group with EEG abnormality maximized over the left hemisphere. The results of this study also show general agreement with those of the previous studies in regard to differences between groups on specific subtests, but larger groups would be required to demonstrate unequivocally the relation of performance on single subtests to locus of brain lesion.

The group of brain-damaged patients without field defects was much more similar to each of the groups with field defects than were the groups with field defects similar to each other. Table 2 shows that only one of the 28 comparisons between the group without field defects and the groups with field defects was statistically significant. Since one out of every 20 comparisons should be statistically significant by sheer chance, it can be concluded that neither of the field defect groups differed appreciably from the brain-damaged group without field defects on any aspect of intelligence test performance. This result suggests that visual field defects *per se* do not produce any impairment of test performance in addition to the impairment imposed by brain damage that may accompany the field defects. Such a finding is not surprising in the case of the Verbal subtests of the Wechsler-Bellevue scale, since all of the verbal subtest material except the two most difficult problems on the Arithmetic subtest is presented orally. However, all of the Performance subtests require the perception of visually-presented stimuli, and Figure 2 shows that the brain-damaged group without visual field defects did not surpass both of the field defect groups on any of the Performance subtests. Teuber (8) has reported that patients with visual field defects exhibit changes in critical flicker frequency, motion perception, and dark adaptation in the supposedly intact regions of their visual fields. This finding, coupled with the results of the present study, suggests that subtle changes in visual functions may be expected to result from brain damage even when more gross visual changes such as homonymous visual field defects are not present.

The results of this study suggest that the most important consequences of homonymous visual field defects with respect to impairment of intellectual abilities of the patient result from brain damage associated with the field defect rather than from an absence of vision in one part of each eye. Patients with right homonymous visual field defects tend to be impaired in verbal abilities as a result of associated left hemisphere damage, and patients with left visual field defects tend to be impaired in certain nonverbal abilities as a result of associated right hemisphere damage.

SUMMARY

The Wechsler-Bellevue Intelligence Scale was administered to 19 brain-damaged patients with right homonymous visual field defects, 19 brain-damaged patients with left homonymous visual field defects, 19 brain-damaged patients without visual field defects, and 19 non-brain-damaged patients without visual field defects. The groups were roughly matched in age and education. The control group was significantly superior to the three brain-damaged groups in Verbal IQ, Performance IQ, and Full-Scale IQ. There was no significant difference among the

three brain-damaged groups in Full-Scale IQ, and the brain-damaged group without visual field defects did not differ significantly from the groups with visual field defects in Verbal IQ or Performance IQ. However, the brain-damaged group with right visual field defects was significantly lower in Verbal IQ than the brain-damaged group with left visual field defects, and the group with left visual field defects was significantly lower in Performance IQ than the group with right visual field defects. The same pattern of results was obtained when subtest scores were individually analyzed. The selective impairment of abilities as a function of the laterality of the homonymous visual field defect was apparently associated with the involvement of the left hemisphere in right homonymous visual field defects, and with involvement of the right hemisphere in left homonymous visual field defects. The similarity of test performance of the brain-damaged group without visual field defects to that of the brain-damaged groups with visual field defects suggested that the loss of vision in one part of each eye did not produce any appreciable impairment of performance in addition to the impairment resulting from associated brain damage, even on subtests that required the correct perception of complex visual stimuli.

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CLINICAL AND BIOCHEMICAL STUDIES OF AN AMPHETAMINE WITHDRAWAL PSYCHOSIS

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Amphetamines have now been used in neuropsychiatry for twenty-five years. They presently occupy a definite place in the neuropsychiatrist's pharmacotherapeutic armamentarium, and are generally considered to be valuable and useful pharmacological agents in the treatment of narcolepsy, alcoholism, depression, obesity, the "hyperkinetic impulse disorder" in children, and also as adjuvants to therapy with barbiturates and tranquilizers. The amphetamines are members of the sympathomimetic amine group, and although their complete mechanism of action in the central nervous system is not definitely known these adrenergic agents are thought to act directly on adrenergic receptor sites, and/or to act as monoamine oxidase inhibitors (6).

The link between amphetamine usage and psychosis was first suggested by Young and Scoville (14) when they introduced the possibility that amphetamine sulfate may have precipitated paranoid psychotic reactions. Since that time many case reports have been published pointing to the occurrence of an amphetamine psychosis either after acute ingestion of amphetamines or with their prolonged use. The typical clinical picture is a paranoid psychotic reaction with paranoid delusions, auditory and/or visual hallucinations, and varying degrees of disorientation initially closely resembling a schizophrenic reaction and/or an alcoholic hallucinosis. It differs from these disorders, however, in that the patient usually recovers completely in one to seven days. The smallest dose associated with this psychosis may have been the acute ingestion of 55 mg. of d-amphetamine sulfate as reported by Wallis, McHarg, and Scott (13), while the largest intake was a daily dosage of 975 mg. of amphetamine base as reported by Connell (3). Shanson (12) reported a psychotic reaction in a seven and one-half-year-old boy after one day of inhalation from an amphetamine inhaler (325 mg. of amphetamine base), and Connell (3) reported a psychosis following parenteral amphetamine injection (methamphetamine hydrochloride—60 mg. intravenously and later 60 mg. intramuscularly). For the majority of amphetamine psychoses reported, however, the patients have used the oral route of administration. A prevalent theme in the literature to date, as emphasized by Herman and Nagler (7), is that the personality of these patients who experience amphetamine psychoses "uniformly revealed evidences of social maladjustment and psychopathy." Connell (3) has reported on 42 patients with amphetamine psychosis and introduced a satisfactory biochemical screening test for urinary amphetamine excretion.

Askevold (1) first reported the occurrence of a psychosis associated with amphetamine withdrawal. Prior to this report, mentions of amphetamine withdrawal phenomena by Bradley (2), Knapp (8), Goodman and Gilman (6), and Connell (3) did not include any descriptions of a withdrawal psychosis. Askevold (1) described four patients whose abstinence reactions were of an "almost photographical likeness," characterized by acute delirious confusion, severe motor hyperactivity, paranoid delusions, auditory and/or visual hallucinations, restlessness, and insomnia. He emphasized that the period of latency between the beginning of abstinence and the onset of psychosis was from three to ten days, and that its duration was from four to eighteen days. The patients described were males between 37 and 53 years

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of age, all of whom had been misusing amphetamines for over four years. One of them was observed during his abstinence reaction to assume "bizarre attitudes." It was noted that in all four patients, abuse of barbiturates had been reported, and that in two of them, barbiturates (3.3 mg. per cent and 1.4 mg. per cent) were in the serum on admission. It was felt, however, that the two with barbiturates in their serum had symptomatology more in conformity with the other two than with the description of barbiturate delirium. Askevold emphasized that the vegative withdrawal symptoms seen on withdrawal from the opium alkaloids and barbiturates were not present in amphetamine withdrawal. Nandelstadh (11) has reported on three cases of amphetamine psychosis, one of whom experienced psychotic reactions on two separate occasions. The first psychotic reaction occurred fourteen days after methamphetamine withdrawal and the second, four years later, after ten days of abstinence from methamphetamine, however, no correlation was made in the report between the psychotic reactions and the methamphetamine withdrawal.

The intention of the present communication is to describe a psychotic reaction in a twelve-year-old boy following the abrupt withdrawal of d-amphetamine sulfate, to present the results of the studies of his intermediary carbohydrate metabolism during and following the psychotic reaction, and then to discuss the implications of these observations and findings.

CASE REPORT

C. G., a twelve-year-old white boy, was admitted to the Lafayette Clinic because of the acute onset of paranoid and somatic delusions, visual hallucinations, insomnia, and impulsive, unpredictable behavior. This onset occurred ten days after his abrupt withdrawal from amphetamine therapy.

The past history revealed that he had been adopted at six months of age and that during his early development he was considered to be somewhat slow, restless, and clumsy. He was first referred to a child guidance clinic at the age of six because of hyperactivity, decreased attention span, and poor impulse control. Psychological examinations indicated normal intelligence but slightly impaired visual motor functioning. Psychiatric evaluation resulted in the diagnosis of a "hyperkinetic impulse disorder" as described by Laufer *et al.* (9). Subsequent examinations at seven and nine years of age confirmed the initial impression. When he was nine years old, because of his symptomatology, d-amphetamine sulphate (20 mg. daily) was prescribed. This resulted in less general motor and more goal directed activity, increased attention span, and better impulse control. The medication was maintained with continuing success for over two years. His last evaluation in conjunction with this therapeutic program was four months prior to admission to the hospital, and no gross abnormalities were noted then.

Two weeks prior to admission the patient's parents abruptly discontinued the d-amphetamine sulphate because of his complaint of insomnia. At that time the patient's home and school adjustment were good and no evidence could be obtained of any physical or psychological trauma. He received no amphetamines at any time after the discontinuation. He experienced no withdrawal symptoms until ten days thereafter, when he suddenly started having difficulty concentrating on his homework. The next day he started experiencing paranoid delusions, had one visual hallucination, and demonstrated loosely associated thought. His paranoid delusions were initially greatly influenced by a movie he had seen the previous day, but subsequently were related to his immediate environment. Two days prior to admission (twelve days after amphetamine withdrawal) his sporadic, impulsive, and unpredictable behavior became grossly unmanageable. He experienced somatic delusions and on one occasion attempted to mutilate himself. He was very hyperactive

and animated during this time and able to sleep only for short intervals.

On intial examination at the clinic, the patient was noted to be acutely disturbed. His general attitude was one of suspicion, although he was superficially cooperative. The most outstanding aspect of his behavior was his sporadic and unpredictable attempts to run away. His talk was often loosely associated; his mood was marked by sudden changes, and he was religiously preoccupied. He would frequently tell of his paranoid and somatic delusions, and attempted often to cope with the feeling that "everything's strange" by stating that the staff members were people very familiar to him, such as his parents, aunts, and uncles. He was disoriented as to time, and his calculating and apperceptive abilities were grossly impaired. The remainder of the mental status evaluation and physical and laboratory examinations yielded normal results.

Following admission to the hospital and during the first 24 hours he received 20 mg. of prochlorperazine to help control his behavior. Early during his second day of hospitalization, he became withdrawn, then mute, and gradually started assuming bizarre positions. The prochlorperazine was discontinued at the start of this phase of his psychotic reaction. During that evening he became cataleptic, had a mask-like facies, and was incontinent. On the third day, however, he became less rigid and was more easily mobilized, though still mute. On the fourth day he was once again talking but would occasionally respond overtly to his paranoid delusions. He exhibited infantile and clinging behavior over the next three days. On the seventh day of hospitalization his ego-boundary difficulties were still present, but thereafter he exhibited what his parents described as his normal behavior and he was discharged two weeks after admission. Therapy throughout hospitalization was of a supportive, non-specific nature. Administration of amphetamines was considered but not carried out due to the patient's rapid return to health. EEGs on the third day of hospitalization and one month thereafter revealed a mild, grade one, generalized dysrhythmia. Psychological test results in the week following his acute psychotic reaction were not essentially different from those four months prior to admission. He returned to school two weeks after the onset of his illness, and since then he has shown fair to good adjustment. The d-amphetamine sulphate was not reinstituted. The patient did show a mild form of the hyperactivity and decreased attention span for which he was initially treated on his return home; but there has been no recurrence of the psychotic reaction, and his peer and home relationships are similar to those before his illness.

TABLE 1

Results of Evaluation of Lactate: Pyruvate Ratios and the Conversion of the 1-Carbon and the 6-Carbon of Glucose to CO_2 in Patient C.G.

Days after hospital admission	Ratios of lactate: pyruvate	Ratios of conversion of the 1-carbon and 6-carbon to CO_2
3	39.7	3.45
14	16.1	6.30
40	—	9.22
60	6.3	3.80
120	2.7	2.32

LABORATORY DATA

All routine laboratory examinations of blood and urine yielded normal results. In addition an attempt was made to evaluate C. G. in conjunction with the current studies at the Lafayette Clinic to ascertain the role of a plasma factor in schizophrenia. Two variables known to be significantly different in the schizophrenic patient from the normal were appraised in this patient and the results are shown in Table 1.

Measurements of both these variables were made three days after admission (at the peak of the psychosis) and then one week, five weeks, two months, and four months after the end of the psychotic reaction. The method of determining the two variables has been described elsewhere by Frohman *et al.* (4, 5). The first measurement involved the

effect of the patient's plasma on the ratio of the lactate:pyruvate produced by chicken erythrocytes. The lactate:pyruvate ratio of chicken cells incubated in plasma from non-schizophrenic male adults varied from 2.3 to 7.5 while that of cells incubated in plasma from schizophrenic patients was above 7.0 as reported by Frohman *et al.* (5). In this patient the lactate:pyruvate ratio was 39.7 at the peak of the psychosis and then at two and four months after the end of the reaction was 6.3 and 2.7.

The second test concerned the rate of conversion of the 1-carbon of glucose to CO_2 and the 6-carbon of glucose to CO_2 by the patient's blood. This is expressed as the ratio 1-C in CO_2 to 6-C in CO_2. Previous work has shown that this ratio is higher in the normal than in the schizophrenic subject. Since values for this variable may be different in children than in adults, no exact comparison can be made with the values previously reported by Frohman *et al.* (4). The ratio for one normal child who was evaluated at the same time as the patient was 9.0. During the psychotic reaction, C. G.'s ratio of 1-C in CO_2 to 6-C in CO_2 was 3.45. Five weeks after the psychosis the ratio was 9.22 and after four months the ratio was 2.32.

DISCUSSION

It is interesting that despite the twenty-five years of extensive clinical experience with the amphetamines, until recently there has been no emphasis on a psychosis associated with amphetamine withdrawal. This is perhaps accounted for by the fact that medical and psychiatric textbooks as a whole place little emphasis on amphetamine psychoses. These psychoses, however, are not as rare as might be supposed, as indicated by the fact that Connell (3) was able to study 42 patients (28 personally) with this disorder. Many of the 100 reported cases of amphetamine psychoses in the literature do not specifically differentiate between excessive doses and withdrawal, so it is possible that the withdrawal aspects have just not been emphasized to date. Contributing, perhaps, to this lack of differentiation is the fact that similar clinical pictures are produced by both. Alcoholic hallucinosis, another toxic reaction related to a drug affecting the CNS, may likewise be precipitated either by abrupt withdrawal from or excessive indulgence in alcohol.

This patient's psychosis followed very closely the clinical picture for "toxic abstinence psychosis" as first described by Askevold (1). Of special interest are the facts that the psychosis occurred after a lengthy period of withdrawal (ten days), lasted only a brief time (ten days), and during the acute phase could not be clinically differentiated from a schizophrenic reaction. Experience with children, however, leads to the observation that a child usually does not present a clinical picture so closely resembling that seen in an adult schizophrenic reaction. This, plus the fact that catatonic phases of psychotic reactions are also relatively rare in childhood, adds to the 'toxic' implications of this patient's psychosis. It is interesting that the third patient described by Askevold also had a catatonic phase of his psychotic reaction. The lengthy period of withdrawal in the psychosis might well be correlated with Connell's (3) observation that amphetamine excretion continues in the urine for four and one-half days after ingestion of the last dose. This particular case, in that it was studied before, during, and after amphetamine therapy, also suggests that a paranoid predisposition need not necessarily be present in the occurrence of a withdrawal psychosis of a paranoid nature. This patient also had not used barbiturates in conjunction with his amphetamines, and so obviates the need for distinguishing his psychotic reaction from any possible barbiturate withdrawal phenomena.

The present communication does not offer any conclusions as to the mechanism of the production of this psychotic reaction. However, two areas of approach to the problem are immediately evident. The first involves the suggestion by Laufer *et al.* (9) that am-

phetamines produce desirable effects in the hyperkinetic impulse disorder, in which the individual is unuaually sensitive to stimuli from sensory receptors, by altering the functions of the diencephalon in such a way as to decrease the unmodulated impulses coming in through the sensory receptors. They might act in this way because of their ability to increase central sympathetic reactivity and to sustain reticular activation and effective filtering of sensory input. The abrupt discontinuation of the amphetamines in this case might well have left the patient without an adequately functioning afferent filter system, resulting in a literal sensory bombardment until his diencephalon was able to resume its pre-amphetamine capacity for afferent impulse screening. The patient's clinical symptomatology is in accordance with this approach in that his psychotic delusions initially involved the movie he had seen, and later the hospital environment. His catatonic state might well be thought of as his final defense against the "input overload" and its resulting psychopathology, as postulated by Miller (10).

The second approach concerns the results of the carbohydrate metabolism studies which pointed out that during the acute stage of the psychotic reaction the lactate: pyruvate ratios showed the same elevation as previously reported in schizophrenic subjects. Subsequent testing indicated a gradual return to ratios expected in the nonschizophrenic subject, very much in keeping with the improvement in the patient's clinical condition. The ratios of 1-C in CO_2/6-C in CO_2 were initially low as encountered in schizophrenic patients, and at fourteen to forty days changed to those resembling the metabolism of a nonschizophrenic subject. At the present time it is impossible to explain the return to "schizophrenic-like" biochemical findings at sixty and one-hundred and twenty days.

Both these attempts to understand the mechanisms involved in this reaction do focus attention upon the need for further study of the cerebral action of amphetamines, their effects on ego boundaries, and their role as psychotomimetic agents.

SUMMARY

The literature considered pertinent to amphetamine psychoses was reviewed and the case report of a psychotic reaction associated with amphetamine withdrawal in a twelve-year-old boy was presented. Observations were offered concerning the clinical aspects of the reaction and the biochemical findings associated with it.

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COMPONENTS OF EROTICISM IN MAN: I. THE HORMONES IN RELATION TO SEXUAL MORPHOLOGY AND SEXUAL DESIRE[1]

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When systematic experimentation is ethically forbidden, the study of rare clinical cases can help to elucidate the components of eroticism in man. This paper is the first of a series of three[3] reporting the study of rare clinical cases of several varieties (Table 1), interspersed with references to relevant published findings of other investigators.

THE MORPHOLOGIC COMPONENT

MORPHOLOGY AND SOCIAL MATURITY

Morphologic maturity of the body, with respect to sexual characteristics, is hormonally controlled. Estrogens are specific for female characteristics, androgens for male, regardless of genetic sex. Pubic and axillary hair are not sex specific. These characteristics of maturity can develop in gonadless boys or girls, apparently under the stimulus of androgens secreted from the adrenal cortex.

Morphologic maturity is a prerequisite of adult eroticism insofar as fully matured copulatory organs are a prerequisite of completely adult erotic experience. Morphologic maturity also plays another, more indirect role in adult eroticism, namely as a prerequisite of normal social maturation in the teens. Social maturity is significantly dependent on social interaction with persons of one's own age, especially during the teenage and early adult years. The person who looks sexually infantile is not fully acceptable to his group, since he looks like someone much younger. His physiognomy and physique do not declare him as a sexually attractive person desirable for flirting, dating or marriage. It is difficult for the boy who reaches the middle or late teens looking juvenile, to behave in a socially mature and grown-up way, for other people, even close friends and family who know his age, habitually and unwittingly react to him on the basis of his physical appearance. They expect him to behave like a juvenile and treat him accordingly. Undeveloped boys are more handicapped than girls: it is more feasible for a girl to disguise, with facial make-up and brassieres padded with falsies, some of the stigmata of sexual infantilism than it is for a beardless, high-voiced boy. Girls as much as boys, however, are adversely affected by the handicap of physical infantilism. Among the ten girls and twelve boys of Table 1 who were over sixteen and physically unmatured, only one girl and two boys had a history of teenage social dating life that approached the norm for their age group.

The obverse of sexual infantilism with respect to the influence of morphologic development on social maturity is found in sexual precocity (15, 26). In this instance, the child looks physically mature while chronologically still a child. The mental age, by contrast, remains concordant with the birthday age. Other people, unwittingly influenced by appearance, regard the child as older than his years and frame their expectancies accordingly. It is therefore possible for the child to become accelerated in

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[3] The second paper will appear in a subsequent issue of this journal; the third is already published (24).

social maturation—indeed desirably so, if social, recreational and educational experience are suitably planned and coordinated to favor this acceleration.

The sexually precocious child who fails to receive an opportunity for accelerated social maturation may thereby suffer a certain amount of psychologic trauma, though not inevitably so. By contrast, the sexually infantile teenager seems exceptionally prone to psychologic trauma relative at least in part to his impaired opportunities for social development. The longer the lag in his social maturation persists, the more difficult becomes the problem of social and psychologic adjustment as a maturing and mature adult, after hormonal substitution therapy has been instituted. A teenager with pubertal failure not corrected until approaching the age of twenty or later, has time in which the patterns of social infantilism may become cemented. If ancillary psychopathologic adjustment to the handicap also develops, that too may become stabilized.

A parallel state of affairs exists in the case of a virilized hyperadrenocortical girl not correctively treated with cortisone until her twenties or older. When treatment finally is given in such cases, the patients abruptly face all the social adjustments of adolescence anachronistically and alone. They have no social support from age mates who are in the same boat. Some of them never really succeed: their patterns of social infantilism or psychopathological adjustment never completely yield to the new way of life open to them.

The early teen years appear to be the critical period for optimal, all-round adolescent development. It is then that adolescent physical growth coincides with the presence of age-mates in the same growth phase, and this coinciding is basic to healthy adolescent psychologic development.

TABLE I

Various Sex-Hormone Anomalies and Numbers of Patients

Unmatured males aged 16 or older, not dwarfed, with hypogonadism and sex-hormone deficiency	11
Unmatured male, aged 21, with anorchia	1
Unmatured females over 16, dwarfed in stature, with gonadal aplasia and sex-hormone deficiency:	
(a) sex chromatin negative (XO)	7
(b) sex chromatin positive (XX)	2
Female, aged 35, sex-hormone deficiency secondary to pituitary deficiency	1
Female hyperadrenocortical hermaphrodites precociously virilized, studied when feminized on cortisone therapy:	
(a) between ages 8 and 14 years	11
(b) between ages 15 and 47 years	17
Boys with precocious puberty of hyperadrenocortical onset, not arrested by treatment	8
Boys with idiopathic sexual precocity	9
Girls with idiopathic sexual precocity	16
Youths with gynecomastia	10
Klinefelter's syndrome	9

SOCIAL HANDICAP OF DEFORMITIES

Not only failure or acceleration but also deviation of morphologic development may have an adverse effect on social maturation and adult eroticism. Dwarfism or extreme obesity, for example, makes a person sexually *persona non grata* to some extent among his age mates. Among anomalies, specifically sexual, the breast-swelling of adolescent gynecomastia in boys is particularly morale-crushing. All ten of the patients in Table 1 were profoundly embarrassed by the girlish-looking swelling of their breasts and avoided exposing their chests to the view of others. Though there were extensive personal variations according to age and social background, all of the boys were more inhibited in their dating and girl-friend relationships than would otherwise have been likely. One older patient had the incipient delusion that his breasts caused other people to suspect homosexuality and three others, younger, needed reassurance that gynecomastia was not the first hideous sign of an unwanted sex transformation.

Defects of the genital organs are usually a worse social-erotic handicap than gynecomastia. To look normal is a great satisfaction to patients with such a deformity. For this

reason, complete therapy for boys with total testicular aplasia consists not only of androgen substitution, but also of surgical implantation of prosthetic testes. For hermaphrodites with ambiguous-looking external genitals, the sooner the incongruity can be corrected surgically, the greater the benefit for their social development, indeed for the very basis of their psychosexual identity.

SEX HORMONES AND SEX DESIRE

In real life, sexual desire occurs in relation to a predicate—desire for someone or something. In the abstract, sexual desire is a concept representing what is left when the predicates are hypothetically removed from specific manifestations of sexual desire. Sexual desire is manifested in erotic imagery, sensation, report and action. Sexual drive and libido may be regarded as synonymous with sexual desire.

In man the predicates, that is the goals or objects of sexual desire appear much more variably determined than by hormones or other biochemical substances. Sexual desire in the abstract, however, appears to be intimately related to the body's metabolism and especially to its hormonal functioning after puberty.

STARVATION AND DESIRE

The relationship between general body metabolism and sexual desire was shown in the case of starvation by Keys, Brožek, Henschel, Mickelson and Taylor (20). Sexual desire then disappears and is completely supplanted by desire for food. Sex imagery and conversation is replaced by fantasy and talk of food. In extreme starvation there is actual failure of sex-hormone secretion. Jacobs (19) wrote of the castration syndrome in emaciated, starving male prisoners of war. Body hair became soft and sparse. Sebaceous glands became unfunctional. Erections and nocturnal emissions disappeared, along with reporting and joking of sexual desire. The effects of the syndrome were readily reversed on two occasions when food packages arrived. Then some of the men grew breasts (gynecomastia), temporarily, presumably because the liver, damaged by starvation, was unable to metabolize estrogens circulating anew in the usual way. Impotence and sterility did not turn out to be permanent sequelae as the men had feared they might be.

HORMONAL MECHANISM AND DESIRE

The mechanism whereby the sex hormones may activate sexual desire in man is not understood. It is most likely that, once an optimal level of circulating hormone has been reached, the control of sexual desire is strictly nonhormonal. Fluctuations of sexual desire might then be explained as dependent on factors like cognitional stimulation and the time interval since the last sexual release.

If the control of sexual desire is attributed directly to the hormones, then fluctuations of desire would need to be attributed to fluctuations in the quantity or potency of circulating hormone, for there is always some hormone circulating in the bloodstream. On the basis of evidence from patients being treated with hormonal substitution therapy, the quantity of hormone given, once an optimal blood level has been attained, bears no direct relationship to sexual desire or sexual activity. Apparently there is a certain amount of hormone that the body can use; anything in excess of that amount is superfluous waste to be excreted. Thus, in the untreated adrenogenital syndrome, urinary androgen excretion is excessively high without excessive, parallel elevation of the patient's sexual desire or activity.

It has sometimes been assumed that sexual desire in women fluctuates with the hormonally controlled menstrual cycle. The trouble with such an assumption is that different authorities attribute the peak of desire to different phases of the cycle. The evidence is far from convincing. Predictable cycles of sexual desire in men have seldom been taken seriously.

Quite apart from the fluctuation issue, there are two rival propositions to support an argument in favor of hormonal influence on sexual desire in man. One is that the sex hormones have a primary activating effect on the reproductive organs from which messages are relayed to the brain and consciousness. The other is that the sex hormones directly stimulate a sex center in the central nervous system, probably in the hypothalamus, from which stimuli are relayed to the genitals. Harris, Michael and Scott (16), in an admirably controlled experiment, showed that stilbestrol microimplanted in the posterior hypothalamus of spayed cats led to the full development of mating behavior, despite a genital tract that remained anestrous. The significance of this finding in the cat for the nonestrous human species cannot yet be conjectured.

So much for the unsolved problem of the mechanism and locale of the influence of sex hormones on sexual desire. It nonetheless remains clear, from the study of hormone-deficient patients, that the sex hormones do exert an influence on sexual desire. This influence is effected *via* the sex organs which are brought to maturity by the sex hormones and kept erotically functional by them. Consider first androgen. The penis and clitoris both respond to initial doses of androgen with extensive dilation of the vasculature and growth in size. Thereafter maintenance of an erection by complete engorgement of the organ with blood is facilitated by androgen. Tumescence of the penis can occur in the absence of post-pubertal levels of androgen, but the erection is generally not complete and not long-lasting.

The genital effects of androgen are over and above the more generalized correlation between androgen and nitrogen metabolism. Correction of an androgen deficiency is accompanied by an increase in nitrogen metabolism and by increased general muscular size and strength. Androgen-deficient men on substitution therapy (Table 1) became sexually more interested, bold and participative, but not because they had formerly been invalids too weak to participate. They did not become more violent, assaultive or aggressive, but more desirous of sexual activity and more competent in sexual performance.

ANDROGEN DEFICIENCY: CASTRATION

The relationship between androgen and sexual performance in males can be studied in hypogonadism, agonadism and castration with and without hormonal substitution therapy. The literature on castration, which is deficient on findings in female castration, has been confusing and imprecise with regard to the erotic functioning and psychology of castrates. Opinions conflict and there is a regrettable lack of well-documented psychologic data. Beach in 1958 (2) and Kinsey, Pomeroy, Martin and Gebhard in 1953 (22) made comprehensive reviews of the literature, incorporating and bringing up to date earlier surveys. Notable for good psychologic data are case reports by Foss (10) and Hamilton (14). Notable for its breadth of scope as well as detail is a recent followup study by Bremer (4) of 244 legal castrates in Norway.

The obvious and most significant generalization to be drawn from the literature on castration is that the effect of the condition on sexual desire and erotic functioning in man is extremely variable. In some instances, loss of both potency and desire follow castration. The loss may be rapid or insidious over a period of months. In some cases the castrate loses potency and the capacity for genital gratification, but continues to experience sexual desire. In a few instances, both potency and desire remain and the castrate continues to copulate successfully for months or even years, though with lessened frequency. It is almost certain that he has no emission, but reports are uninformative as to whether some sort of orgastic climax is experienced or not. Postcastration impairment of desire, potency, emission or

orgasm is readily reversed by androgen substitution therapy.

There are no statistics from which to draw comparisons between the phenomenology of postpubertal and prepubertal castration. The one anorchid patient in the present series, though physically prepubertal when first interviewed at the age of twenty-one, experienced sexual desire, was married and had satisfactory sexual intercourse about three times a week according both to his own testimony and that of his wife. He had no emission or orgasm, as he did after androgen therapy, but simply an unclimactic feeling of pleasure. A prepubertal sexual history of this type is probably rare in eunuchs and the hypogonadal, who appear more often to have a prepubertal sex history limited to fantasy with little sexual action. The twenty-two gonad-deficient men and women of Table 1 showed (or retrospectively reported) a wide variability of erotic interest and activity before hormonal substitution therapy was begun and also in response to induced puberty. Some of them remained erotically relatively indifferent after treatment. But in no instance did erotic imagery and activity decrease after treatment. The general trend was quite clear to see: hormonal medication rehabilitated the erotic life and genital function. The effect was more clearly evident in the men than the women of this particular series.

SUBSTITUTION THERAPY LAPSED: MEN

Sex hormone deficiency can be investigated in eunuchism and hypogonadism not only in studies of sexual function before and after treatment is begun, but also in studies of the effects of lapses of treatment once these same patients have commenced taking hormones.

Of the eleven hypogonadal men entered in Table 1, there were five who discontinued androgen medication for a period of three months or longer. Three of them went through periods of discontinued treatment while being adjusted to a medicational routine; one discontinued treatment to avoid the problems of activated sex drive—he was physically deformed and morally very straight-laced; and one became periodically lax about getting an injection of long-acting testosterone each month.

In each case, the absence of androgen from the tissues made a decided difference to sexual desire and sexual performance. The most sensitive indicator was the ejaculate from the seminal vesicles and prostate. The men reported that it gradually diminished in volume until no fluid was emitted at all. The feeling of orgasm either was lost through disuse of the penis erotically, or was changed in quality. There were fewer erections. There was a lessened initiative to masturbate or to make coital advances. With loss of ejaculation, the men also lost whatever erotic, ejaculatory dreams (wet dreams) they had been having. They considered that waking erotic imagery and daydreams diminished in frequency of appearance.

One may generalize and say that these men did not lose completely their erotic imagery, their erotic sensations, or their erotic actions and behavior. What did happen was that eroticism, whether in imagery, sensation or activity, did not get initiated with the same frequency as before. This failure of initiation showed up in the involuntary failure of the penis to erect or hold an erection, and in the failure of other, more voluntary erotic action and coordinated endeavor as well.

The man who was married when he discontinued treatment had a good barometer of failure of his erotic initiative, namely his wife's comments and complaints. In fact, this man, and the two others who also got married, found that it paid them not to be lax about their injections. They reported a slackening of erotic initiative, including erectile potency, if they delayed even a week in getting their monthly injection of long-acting testosterone.

The conclusion to be drawn from periods of interrupted treatment in men with sex-

hormone failure is that androgen is necessary not only to induce morphologic maturity of the sex organs, but also for the maintenance of sexual desire and active eroticism.

SUBSTITUTION THERAPY LAPSED: WOMEN

There were four hypogonadal women who discontinued estrogen medication for three months or longer. One of them was off treatment for three months by her physician's request. She happened to get married during the first month. Two others were single and celibate. One of these two discontinued treatment with stilbestrol for eighteen months, before resuming on premarin, as stilbestrol produced unpleasant gastric symptoms. The other single woman, a graduate nurse, had been off treatment for two years, having discovered that the only sequel of significance in her rather puritanical life was cessation of the menses. The fourth woman was divorced. She discontinued treatment after a doctor scared her about the carcinogenic dangers of estrogen, and found no ill effects from not taking estrogen. She continued to have sexual liaisons, casually, with men she met professionally in show business during the five years off treatment, though eventually she discovered that vaginal tightness and dryness due to lack of estrogen-stimulated secretions was undeniably a handicap.

These four women had been on cyclic estrogen therapy so that they menstruated upon cyclic withdrawal of estrogen for a week each month. Following total withdrawal of estrogen, they ceased to menstruate altogether. Vaginal smears showed that the vaginal mucosa underwent involutional changes as in postmenopausal women. There were no definitive reports of hot flashes or malaise typical of the climacteric, however. Vaginal secretions concomitant with sexual arousal no longer appeared.

The women reported nothing to indicate any change in their erotic imagery, sensations or actions. The two who were having intercourse claimed definitely that they reached the climax of orgasm, as they did when taking estrogen.

The evidence from these four women is consistent with common knowledge concerning postmenopausal disappearance of estrogen in ordinary women. Though there are exceptions, erotic imagery, sensations and actions are not abolished and sexual desire is not necessarily even lessened in the usual course of diminished estrogen production at the menopause.

ANDROGEN: THE LIBIDO HORMONE

The relationship of estrogen to eroticism in the adult female seems, after the pubertal estrogenic functions of maturing the reproductive tract and feminizing the body morphology in general, to be restricted to maintaining the lubricant secretions of the vagina preparatory to copulation (31). The primary estrogenic function would appear to be monitoring endometrial growth in close coordination with the gestagenic function of monitoring nidation and gestation.

Since maintenance of sexual desire and erotic functioning in men appears to be significantly dependent on androgen, it would be an odd biological discontinuity that ordained erotic imagery, sensations and actions in the female of the human species to be, by contrast with estrous behavior of lower mammals, independent of hormonal functioning.

It being mechanically possible for a flaccid, unconscious female body to receive the male in coitus, though not *vice versa*, one may use the logic of extreme absurdity to argue that passivity and female eroticism are synonymous and that there is indeed a biological discontinuity between human male and female so far as erotic desire and hormones are concerned. Such a position is not to be taken seriously.

A tenable hypothesis is that sexual desire with its attendant imagery, sensations and actions is maintained well-functioning in

both men and women by androgens. In women the androgens of eroticism may conceivably be of an origin as yet unknown, or they may be metabolically derived from gestagens. The most likely explanation, however, is that these androgens are of adrenal origin. Waxenberg, Drellich and Sutherland (33) reported an excellent study of eroticism in twenty-nine women who had had both ovaries and both adrenals removed in the treatment of breast cancer. Loss of only the ovaries and ovarian hormones had no definite adverse effect on sexual drive, activity and response, but all three were diminished or abolished in most of the women after their adrenals also had been removed. The adrenals secrete some estrogen, but larger amounts of androgen. The authors concluded that the loss of adrenal androgens was the responsible factor in the women's lessened or abolished eroticism.

There are other lines of evidence that can be marshaled to support the hypothesis that androgen is the libido hormone in both men and women. Salmon and Geist (31) assembled some very impressive evidence from groups of women patients who were given variously androgen, estrogen or both. Androgen was found to increase the sensitivity of the genitals, especially the clitoris, as well as to heighten desire and increase sexual gratification; but estrogen was necessary to abolish vaginal dryness and tenderness and so expedite coitus. It is a common part of the clinical lore of gynecology that many women for whom androgen therapy is prescribed report a definite increase of sexual desire as a side effect: this has been commented on by Salmon (30); Carter, Cohen and Shorr (5); Foss (11); Kupperman and Studdiford (23); and Dorfman and Shipley (6). Conversely, in the clinical lore of urology, many men for whom estrogen is prescribed report great diminution or total abolition of sexual desire and activity: among others Foote (9) and Paschkis and Rakoff (29) have written of this. Gestagens seem to have a similar libido-inhibitory function in men, as reported by Greenblatt, Mortara and Torpin (13) and Heller (17).

The androgen-libido relationship is far from being a simple linear correlation. There are irregularities that cannot at present be explained and that will require controlled pharmaceutical experiments, preferably on human subjects, for their proper resolution. One needs to know, for example, more about quantitative relationships. Apparently there is an optimal point beyond which added androgen does not increase frequency or degree of eroticism. Heller and Maddock (18) reported no increase in sex drive when hormonally normal men were given testosterone. In women it seems likely that a large enough quantity of androgen will suppress estrogenic function while maintaining libido, whereas more equal amounts of the two hormones may have a coexistent or even synergistic effect.

Yet another type of information is needed concerning specificity and failure of target-organ response. To illustrate: there are some fertile females, and some simulant females with feminizing testes and male sex-chromatin pattern, who fail to grow sexual hair, and in one case of Wilkins (34) attempted treatment with testosterone by mouth and locally applied in an ointment failed to have any effect. There is no doubt that one occasionally encounters instances of target-organ failure of erotic sensitivity and response, irrespective of androgen titers in the bloodstream. One patient, a woman with gonadal aplasia and male sex-chromatin pattern, was given 10 mg. of methyl testosterone a day for a month. There was no change in her grossly inert eroticism, nor in her very placid behavior. Another patient, a man with Klinefelter's syndrome and female sex-chromatin pattern, was unique among others of his type in that he showed neither morphologic nor libidinal response to large doses of long-acting testosterone (400 mg. of

testosterone enanthate a month for three months).

Further data are needed also on the time factor in relation to hormonal effects. It seems likely that the body may develop some degree of hormonal tolerance, perhaps by way of conditioning and learning. Thus, it was commonly reported by hypogonadal men patients that erections were triggered off with greater ease and frequency, by even the mildest friction of the clothing, during the first month of androgen therapy, than was subsequently the case. Salmon and Geist (31) reported a similar transient exaggeration of libido in some of their women patients treated with testosterone for various endocrine disorders.

Finally, one needs to know more of the fine points concerning the biological effects of the many biochemical forms of the sex hormones that can be differentiated in fractionation analysis. It is known, for instance, that some of the structural variants of testosterone are biologically inert. It is quite possible that others have potencies and functions that are somewhat specific and different from one another.

Irrespective of problems to be solved, the sex drive appears from the hormonal point of view to be neither male nor female, but undifferentiated—an urge for the warmth and sensation of close body contact and genital proximity.

HORMONES AND MALE-FEMALE DIFFERENCES OF DESIRE

It has long been a popular theory that the sexual inclinations, thoughts and dreams of men and women are different in content because the hormones of the two sexes are different. From this doctrine derives the assumption that homosexuality is a hormonal disorder—an assumption held in discredit by the majority of endocrine authorities today. Heller and Maddock (18) reviewed studies made in the 1940's by Glass, Deuel and Wright (12), Neustadt and Myerson (27), and Sevringhaus and Chornyak (32), to test the hypothesis that homosexuals (male) differ from control subjects in their urinary output of androgens and estrogens. The studies failed to give an affirmative result. Urinary output of both androgens and estrogens was found to have the same variability in homosexual men as in men in the control group. The estrogen-androgen ratio was higher than expected more often in the homosexual than in the control group of one study. The significance attached to this ratio was criticized by Kinsey (21) and is even more open to criticism today in the light of new techniques of estrogen assay. The rather crude bioassay methods used in the 1940's have been largely supplanted by the more accurate and refined fractionation methods of contemporary research.

Failure to detect an hormonal anomaly in homosexuals has been paralleled by a failure to effect a cure with hormonal treatment. Androgen does not masculinize the erotic inclination of a male homosexual. It either leaves his eroticism unchanged or else intensifies it in the homosexual direction.

The obverse of a lack of abnormal hormonal findings in homosexuality is the lack of increased incidence of homosexuality in sex-endocrine dysfunction. Estrogen levels are elevated in males with gynecomastia sufficiently to cause prominent breast feminization. There is no corresponding feminization of the personality. Androgen levels are elevated in females with hyperactive adrenals or, more rarely, a virilizing tumor. There is no corresponding lesbian virilization of the personality.

There is no special affinity between homosexuality and lack of hormones to bring about complete maturation of secondary sexual characteristics in men and women, respectively. In men, Klinefelter's syndrome is an instructive example of weakened androgen action (plus seminiferous tubule dysgenesis, sterility and possible gynecomastia), because it is also accompanied usu-

ally by a supernumerary chromosome. The sex-chromosome constitution is XXY, whereas the normal male is XY and female XX, and the total chromosome count is 47, not 46—Ferguson-Smith (7). There is no corresponding psychosexual epicenism as part of the syndrome though, of course, homosexuality may occur in a man with the condition and was so observed in one of the nine cases of Table 1. In two other cases, both boys in their teens, there was a possible homosexual tendency disguised by the sexual indifference and low-powered sexual activity which was so commonly evident in the syndrome.

Homosexuality may occur among those with a chromosomal abnormality, but chromosomal aberration is not a demonstrable characteristic of homosexuals, as was shown in a properly controlled study by Pare (28) and another by Bleuler and Wiedemann (3). Barr and Hobbs (1) found typical male chromatin pattern in the cell nuclei of five cases of genuine male transvestism.

HORMONES AND SEX-CHROMOSOME STATUS

In the ordinary course of events, hormonal status as male or female correlates perfectly with chromosomal status as male (XY) or female (XX), and both these variables correlate perfectly with the reproductive anatomy as male or female. These correlations are not invariant, however. They go awry in certain endocrine disorders (see above) and in hermaphroditism (25). In the syndrome of testicular feminization, for instance, gonads that are histologically testes produce powerful estrogens. They are found in the groins of a person who is morphologically entirely womanly (and psychologically womanly also), but who has no uterus and tubes. The sex chromosomes are XY and the total chromosome count is 46.

Normal female hormonal functioning has been observed in women who have 47 chromosomes and an XXX sex-chromosome count. Male hormonal functioning has been found in men who have supernumerary sex chromosomes, namely XXXY as well as XXY (8).

The relationship between sex chromosomes and sex hormones is a very loose and indirect one. The sex hormones exert their influence relatively independently of the cytogenic structure of the body's cells. Just as the sex hormones are nonspecific for the direction of erotic inclination, correspondingly the sex chromosomes are not specific determinants of the direction of erotic orientation.

SUMMARY

It is not in a rigid, inalterable way that the male or female status of the sex hormones parallels the male or female status of the sex chromosomes, and deviations do occur. Similarly, there are deviations from the normally expected correlation between gonadal structure and hormonal status. Embryonic and fetal sexual differentiation is very sensitive to male or female hormonal balance, irrespective of chromosomal and gonadal structure. Hormonal balance at puberty may or may not be congruous with the sex of the reproductive organs, but estrogens are specific for female and androgens for male secondary sexual characteristics, irrespective of genetic or gonadal sex. Anomalies and incongruities of secondary sexual characteristics have repercussions on social and psychosexual maturation. The level of sex drive or libido is hormonally influenced, and androgen is probably the libido hormone in both men and women. The male and female sex hormones have a direct male and female effect, respectively, on the genitalia, maintaining them erotically functional. The direction or content of erotic inclination in the human species is not controlled by the sex hormones. Hormonally speaking, the sex drive is neither male nor female but undifferentiated—an urge for the

warmth and sensation of close body contact and genital proximity.

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CONGENITAL INDIFFERENCE TO PAIN

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The subject of congenital indifference to pain has intrigued neurologists and psychiatrists for many years despite the few case reports in the literature. In an excellent review, Critchley (1) discussed indifference to pain and reviewed the literature to 1956, noting the many incomplete reports and suggesting lines of further investigation. It is hoped that the study of additional cases of this condition will eventually shed more light on the complex problem of pain itself. For this reason, it is of more than academic interest to continue to study and report such cases.

In order to assess indifference to pain it would be desirable to have a definition of the word "pain"; however, the peculiarly subjective nature of the sensation defies suitable definition. Sir Thomas Lewis in the preface to his book on pain states, "Reflection tells me that I am so far from being able satisfactorily to define pain, of which I here write, that the attempt could serve no useful purpose. Pain, like similar subjective things, is known to us by experience and described by illustration" (2). Despite the inadequate definition of the term, we must fall back on the word "pain" throughout this discussion. Congenital indifference to pain apparently seems to be a specific entity in which, despite apparently normal perception of sensation, the individual fails to perceive noxious stimuli as unpleasant. As Critchley has noted, there is dissociation between the various components of the normal pain experience which consists of: 1) the qualifying notion of pressure, cutting, heat, etc., which constitutes the nature of the pain; 2) the highly unpleasant sensation which constitutes the specific sense-datum of pain; and 3) the feeling-tone of displeasure. In congenital indifference to pain the third component is disturbed and perhaps also the second.

The differential diagnosis of congenital indifference to pain naturally includes hysterical states and other disorders of the central or peripheral nervous system where extensive involvement of sensory modalities is present. Whether the defect resulting in indifference to pain is anatomic, chemical or psychologic cannot be proven at present.

This paper reports three patients with congenital indifference to pain who were studied from the neurologic, psychiatric and psychologic standpoints. The psychological examination consisted of: Wechsler Adult Intelligence Scale (WAIS), Rorschach, Thematic Apperception Test, Bender Gestalt Test, Human Figure Drawings, and a Sentence Completion Test. Throughout these histories it should be noted that one of the physicians' major problems was to communicate to the patient what he meant by the word "pain."

CASE REPORTS

CASE 1

H. R., a 56-year-old white male, a retired insurance agent, was first seen in May, 1957, complaining of progressive muscle weakness which began at the age of 52. The weakness began and remained most severe in the proximal musculature of all extremities although it slowly progressed distally. Mild atrophy developed in proportion to the location and

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severity of the weakness. There were no sensory complaints. The patient also stated that at the age of 53 he suddenly developed a right-sided facial paralysis which improved somewhat but never completely disappeared. Additional medical history disclosed that the patient had noted dyspnea for several years and had experienced Raynaud's phenomenon in the hands after exposure to cold.

The general physical investigation resulted in diagnoses of chronic bronchitis, pulmonary emphysema, mild arteriosclerotic heart disease and Raynaud's phenomenon of unknown etiology.

Neurologic Examination: The cranial nerve examination disclosed a partial right peripheral facial paresis. The sternomastoid and trapezius muscles were weak. Motor examination disclosed diffuse muscle weakness, most marked proximally. Slight atrophy was noted about the shoulder and pelvic girdle. The deep tendon reflexes were normal. No fasciculations were observed.

An electromyogram was compatible with the diagnosis of muscular dystrophy. A muscle biopsy showed clearly myopathic alterations with degenerative changes in fibers of various size occurring diffusely. In some areas infiltrations with lymphocytes were noted.

A diagnosis of proximal myopathy of undetermined etiology was made. A neostigmine test was performed which was equivocal; therefore the patient was treated with pyridostigmine for several months, but he eventually abandoned the use of the drug and a diagnosis of myasthenia gravis could not be confirmed.

During the course of the studies it became apparent that the patient was indifferent to various types of painful stimuli in all parts of his body. The patient stated that this indifference had been present all his life. There had been no tendency to develop greater appreciation of pain as he grew older. He did not appreciate itching and was not ticklish. As a child he could be lifted by his hair and pulled across the room without crying or seeming upset. Pulling out pieces of hair was also done without apparent discomfort. The patient on several occasions after injury to a fingernail had peeled off the whole nail without any anesthetic and with no discomfort.

While he has noted that other people who hit their finger with a hammer would wince in pain and sometimes cry out, he considered that it was they and not he who were reacting in an unusual manner. He had received many electric shocks and at one time he would stop the engine of an old car by placing his fingers on the spark plugs to produce a short circuit. He noted that his hands might go into spasm but this was not uncomfortable. He had worked during his youth as a welder and had received many burns and often had particles get in his eyes but did not feel pain. The Raynaud's phenomenon that he had experienced in recent years was also painless. He had broken his wrist and leg and had not experienced discomfort. Despite this indifference to painful stimuli the patient stated that he was quite capable of recognizing intensity of stimuli and appreciating degrees of temperature. Therefore, he had learned early in life to avoid stimuli that could produce blisters or harm him, and consequently had received no serious injuries throughout his life. When he did injure himself there was no difficulty in healing.

The patient stated that he perceived pleasant stimuli normally, and as a specific example, he commented on the pleasure of smoking. It would seem that eating and sexual relations were perceived with a normal degree of pleasure. Despite the indifference to superficial pain the patient did state that he experienced headaches as very uncomfortable sensations. He also commented that a full bladder produced an uncomfortable sensation as did hunger. It was difficult, however, to assess the degree of visceral pain that the patient could perceive for there was always a question as to whether

the patient fully understood what the examiner meant by the use of the term pain. Nevertheless, headaches, stomachaches and a full bladder did produce some degree of discomfort when evidently no cutaneous stimuli could be applied that were interpreted as uncomfortable in any way.

Numerous sensory examinations disclosed that the patient could perceive the difference between the head and the point of a pin on any part of his body. He could recognize slight differences in intensity of the sharp stimuli. It was impossible, however, to give a stimulus sufficiently intense to produce discomfort. There was no grimacing or other action of the patient that would suggest pain and there was no alteration in pulse, respiration or pupils when cutaneous stimuli were intense enough to draw blood. Squeezing the Achilles tendon and testicle also produced no evidence of discomfort. Discrimination of degrees of temperature also was accurate but when sufficient heat was applied to burn the patient's skin, he made no movement of withdrawal nor did he show subjective or objective signs of pain.

Special senses were all normal. The corneal reflexes were present. Other aspects of the sensory examination were entirely normal. An electroencephalogram was within normal limits.

Several special tests of reaction to painful stimuli were performed. A vitalometer testing device was used to render electrical stimuli to the lower teeth. On the lower cuspid and incisor teeth the maximum electrical stimulus (50–60 microamperes at a frequency of 5000 cycles per second) evoked no subjective or objective evidence of discomfort to the patient. There was no change in pulse or respiration or pupillary size during the test. Cystometric examinations were done. Three hundred cubic centimeters of fluid in the bladder produced slight discomfort to the patient, and the first urge to urinate occurred after one hundred centimeters had been introduced. It was not possible to determine whether discomfort was less than normal. A skin and muscle biopsy were planned without anesthetic. When the skin was removed there was no subjective or objective sign of discomfort. When the muscle was cut the patient stated that he experienced a sensation which was "disagreeable." At this point the surgeon injected a little local anesthetic. The patient stated that he really didn't think it necessary. It did seem, however, that cutting the muscle produced some unpleasant sensation, while cutting the skin produced no discomfort. Examination of the nerve endings of the skin showed no abnormality. Inflation of a blood pressure cuff to 200 ml. of mercury with subsequent requests to make a fist produced no discomfort after eighty attempts.

The patient's behavioral response and galvanic skin resistance to sudden electric shock were studied. The patient showed no evidence of pain to shocks which were quite painful to normal subjects. It was apparent that he "felt" the sensation, as there was a definite drop in galvanic skin resistance.

The patient was followed until the time of his death from cardiac failure in July 1959. The brain was obtained for study. Gross appearance of the cortex, brain stem, cerebellum and upper cervical cord were normal. Preliminary microscopic examination shows no abnormality, but additional studies will be reported.

Psychiatric Evaluation: The patient was born on a farm and was the oldest of three boys. He described his mother with great reverence and said she was affectionate but not demonstrative. He was punished occasionally with a switch which distressed him as "I feared my mother's wrath," but not because of the pain of the beating, which he did not experience. His father was described as a "crude ward-heeler" who spent most of his time in political activities and running a bar, and had little contact with his sons. When the patient was fourteen, he decided to leave home because he felt "picked on" by the school principal. His life at home had always been a series of chores with little help

from his younger brothers. His only regret at leaving home was that he would miss his mother; he was not particularly close to his brothers. The father permitted the boy to leave, thinking that he would return shortly, but the boy found a job just as he was about to run out of money, and steadfastly remained where he was despite his father's attempts to tease him into returning home. He was a diligent worker all his life. His marriage was described as happy and successful.

The patient was cooperative and friendly; he spoke freely but waited to be questioned. The stream of thought was normal. There were no unusual preoccupations, bizarre thoughts, or psychotic ideation. He tended to describe the emotional reactions of others in behavioral terms, giving the impression that he must intellectualize feelings in others because of an apparent inability to experience them emotionally himself. However, on other occasions in the interview, particularly when speaking of his boyhood attachment to his mother, his affective response was strong.

Psychologic Examination: This patient was very conscientious; he showed perseverance and stubborn tenacity by his refusal to give up in the face of tasks which were too difficult for him, and he occasionally ruminated about answers long after a question had been asked. In the less structured situation of the projective tests he became rigid, overcautious, unsure of himself, and constricted to the point of severe blocking during the Rorschach.

The patient was of bright average intelligence (I.Q. 111). Indications of a mild organic brain syndrome were suggested by certain motor difficulties, perplexity, and his trouble conceptualizing and integrating complex tasks. He seemed much more comfortable when he had a concrete model before him.

He was reserved, independent in his thinking and judgment, and he had enough self-assurance to be able realistically to accept the limits of his knowledge. He attempted to remain calm, but became increasingly restless and had occasional parapraxes as time went on. His anxiety was greatest in the Rorschach and reached a peak during and following a response which appears to represent a self-percept. He saw what "might be a turtle run over by a ten-ton truck" which he described as crushed and blood-spattered. This response was given only after an excessively long reaction time to the ink blot; it was his only percept which deviated in any fashion from the banal or "popular," and following it he was unable to see anything on the last four blots. For these reasons it is assumed this response had great personal meaning for the patient. The turtle, a creature so well defended by its natural endowments, required a mighty force to shatter it. The perception was experienced as a threat of annihilation by the patient, and it resulted in a denial or massive repression of any further perception on the test.

Additional support for this impression was found in his figure drawings, which were poorly differentiated, sketchy, primitive, and appeared to be disintegrating, as well as in his concern about invalidism in the Sentence Completion Test. He retained on the one hand the narcissistic conviction that he could "do most anything" and feared "nothing," while on the other hand he showed a profound reaction to threats to his body integrity. Certain doubts had begun to interfere with his calm and assured attitude toward his symptom. These doubts had some basis in reality, since a diagnosis of muscular dystrophy had been given to the patient.

In his object relations this patient seemed warm, steady, and somewhat inhibited. He placed great emphasis upon tact, courtesy, gentlemanly behavior, and hard work, and he was quite moralistic in his attitudes. In these traits of character he appeared to counteridentify with his father.

The tests revealed no evidence of psychopathology outside that range broadly considered normal.

CASE 2

J. B., a 42-year-old white male high school industrial arts teacher, was examined in 1958 because of a complaint of fatigue, dizziness, and a tight sensation in the abdomen. The general physical examination was within normal limits, as were blood studies, urinalysis, chest and gastrointestinal x-rays. The final medical diagnoses were functional bowel distress and mild postural vertigo.

During the course of the medical studies the patient was found to be indifferent to many painful stimuli. He was not surprised by the finding that he was indifferent to somatic pain. He had often noted that others seemed to be more affected by injuries that they received than he was, but he had assumed the difference to be due to other people being more sensitive rather than to a decreased sensitivity in himself. He was able to give many anecdotes to illustrate this point. For instance, around the age of seven his left index finger was caught in a cream separator and crushed. The patient stated that he suffered no particular discomfort during a long wait for the doctor, who then amputated the finger. The patient also described a game in which he and his friends engaged during his childhood which consisted of pulling each other around by the hair. While this experience caused him no discomfort, his friends often cried out when subjected to the hair-pulling. The patient's attitude was that these boys were "sissies." He had the same attitude toward some of his students. He had noted that while he handled hot solder with his bare hands the pupils required gloves. He had attributed this to weakness or immaturity on their part rather than to an insensitivity in himself. If his students cut themselves in class and complained of pain, he chided them for such reactions. The patient stated that he was never bothered by the numerous cuts and bruises which he received during his lifetime and he told of an occasion several years ago when he was accidentally wounded by a shotgun but felt no pain. On one occasion he injured his ankle and walked a considerable distance to a doctor who discovered that he had a fracture. The patient denied experiencing pain either from the injury itself or the manipulations by the doctor. The patient had no difficulty with healing after injuries. There had been no tendency for his indifference to pain to change as he grew older.

The patient had had recurrent headaches for a number of years and described the sensation as uncomfortable. Abdominal cramps were similarly described as uncomfortable, but not painful. The semantic problem of discussing pain made analysis difficult, but it did seem that the patient probably perceived visceral pain to some degree, but not normally.

The patient felt that he perceived touch and temperature variations normally. He did not feel itching or tickling. He stated that pleasurable sensations, such as eating, relieving thirst, smoking, and sexual relations were enjoyed normally.

The patient added that five of his six sons were, like himself, insensitive to pain. They would enjoy having their teeth drilled by a dentist and had no fear of injections. They had never cried after minor trauma. He contrasted these children with the other son and his wife, whom he seemed to regard as "weaker." Unfortunately, the father refused permission for examination of his children, stating that he did not want them to realize that they were different from other children.

Neurologic Examination: The neurologic examination was within normal limits. The patient could recognize the slightest touch with a wisp of cotton. Varying intensities with pain and various temperatures would be recognized, but no subjective or objective

evidence of discomfort could be noted after extreme stimuli. Pressure on the Achilles tendon and testicle did not produce discomfort. There were no alterations in heart rate, or blood pressure or pupil size to painful stimuli. Corneal reflexes were normal. Smell and taste were normal.

Application of an ice cube over the front teeth for five minutes produced no apparent discomfort or alterations in heart rate or pupil size. Inflation of a blood pressure cuff to above systolic blood pressure with subsequent requests to make a fist produced no discomfort after ninety attempts. The patient's schedule did not allow cooperation for additional investigation.

Psychiatric Evaluation: The patient was the youngest in a sibship of three, and the only boy. He described his home as being particularly close-knit and stated that his relationships with his parents and siblings had always been warm. His father was described as a strict but loving man. His two sisters were in good health and were said to be happily married. He felt that he had a normal childhood.

The patient was somewhat gruff in his manner, but he was generally cooperative and not unpleasant. He spoke freely and easily despite some evident anxiety, and his affect was of normal depth and lability. He was unconcerned about his lack of somatic pain, and indeed was outspokenly proud of it. He told of pulling his sons' teeth with pliers and described his plans for delivering his wife's forthcoming child without medical assistance, feeling himself competent to do these things. No abnormality of the stream of thought or aberrations in the content of thought were noted other than his tendency toward expansiveness and grandiosity. Sensorium, memory and orientation were intact.

Psychologic Examination: This patient's pride and his excessive self-assurance disappeared in the testing situation, and he became fearful, anxious and defensive. He tried to combat these feelings by making light of the situation, by demanding advice, or by turning the tables on the examiner and giving his own "test." He was reluctant to accept the responsibility for what he saw on the projective tests and was most uncomfortable with any task in which he had to express his own feelings or ideas.

This patient was of bright average intelligence (I.Q. 111). He was an unreflective individual who was much more at home with motor tasks than with ideas or verbal material. He showed typical interferences in attention due to anxiety, in addition to slips of speech, sweating, and other signs of manifest tension. He fancied himself as a capable and reliable leader in emergencies despite his tendencies toward brashness and impulsivity. He showed a great need to deny any helplessness, weakness, or passivity in himself, and he tried to insist upon his invulnerability. He was indeed almost compulsively busy, working nights in a factory and running a moderate-sized farm in addition to his teaching; he also required this level of activity from persons close to him. He perceived himself as conscientious, neat, dutiful, helpful, and he was not sympathetic with those who waste time, have debts, gamble or "go to games or to a tavern." These qualities of conventional morality were carried to the rigidly excessive point of parody in this patient. He even made certain to temper his narcissistic feelings of superiority by an attitude of humbleness "in order that we not be thought haughty."

The patient's childishness was clearly evident in the projective tests. The qualities mentioned above represent an aspect of the "model boy," but he also showed a mischievous desire to circumvent authority and to make his own rules. When he was not allowed to do this, he resorted increasingly to more primitive defenses such as denial, negation, and rationalization. His object relations were immature; he identified strongly with his children, with whom he felt he formed a wall of impenetrable strength, and he needed to best his wife in the competitive manner of a brother teasing

a sister. However, he showed a strong need to excuse aggression in others, or pass it off as meaningless. He denied, by example and in his TAT stories, that he could possibly be hurt, but he drew a figure of a man wearing heavy clothing and an aluminum helmet "to protect his head from injury while working." His several anatomical percepts on the Rorscach also indicated a heightened concern with his body and the prospect of damage to it.

Of the three patients, he gave a record most closely resembling that of a hysterical personality, especially in such features as his lability, childishness, unreflectiveness, and naiveté. His tests also showed hypomanic qualities, and his compulsivity and strong reaction formations were salient characteristics. However, this examination did not reveal a grossly deviant individual.

CASE 3

R. H., a 67-year-old white male, was seen in July 1958 with a complaint of shortness of breath. A single episode of syncope occurred two weeks prior to admission. General physical investigation disclosed evidence of mild arteriosclerotic cardiovascular disease and hypotension.

During the study of this patient, it became evident that he was indifferent to painful stimuli. The patient stated that this had been true for as long as he could remember. In early childhood, he recalled cutting and bruising himself on numerous occasions and wondered why his playmates would cry when they received similar injuries. At the age of seven, he remembered receiving severe lacerations on the face due to an explosion of gun powder, but he felt no pain. Solder burns on the legs were not painful and sunburn was painless. He had crushed a finger in a door with no pain. He could recognize intensity of stimuli, and had learned to avoid situations that would be unduly harmful. He had, therefore, gone throughout life without any mutilating injuries.

This patient noted that he had experienced tickle under his arms and in his nostril (even though the examiner failed to produce discomfort by tickling these areas). He stated that he could perceive itch, although it was impossible to determine the degree of discomfort produced; he stated that it was "not pleasant."

He noted that "tightness" in the chest, a "bloating sensation" in the abdomen, and a very full bladder would produce "discomfort." It seemed evident that there was some degree of visceral displeasure or "pain" although the patient would not admit to any discomfort produced by cutaneous stimuli except for "itch" and "tickle" as mentioned above. There had been no tendency for the indifference to cutaneous pain to become less through the years.

It was rather difficult to assess pleasurable stimuli. He stated that his libido had been normal in his youth. He stated, however, that he "ate to live" and didn't really enjoy food, but apparently he did appreciate his daily cocktail. The overall impression was that the patient did appreciate enjoyable stimuli to a low normal degree.

Neurologic Examination: Cranial nerve function was entirely normal, including special senses. Motor examination and reflexes were normal. Superficial, deep and combined sensory modalities were normal as far as recognition of stimuli was concerned. Although the patient perceived painful cutaneous stimuli, extremes of stimulation by pin prick and temperature did not produce subjective or objective evidence of pain. Deep pain tested by Achilles tendon pressure evoked no evidence of discomfort. Testicular pressure to a strong degree evoked no autonomic or obvious motor expression of pain but the patient stated that it was "uncomfortable."

Several special tests of reaction to painful stimuli were performed. A skin biopsy was obtained, a large piece of skin being removed from the thigh without anesthetic. The patient stated that the procedure was painless. The pupils, pulse, and respiration did not

change during the biopsy. Nerve endings in the skin were normal. A vitalometer was placed on several teeth with intact nerve supply. A maximum electrical current produced no subjective or objective painful reaction. Skull x-rays were normal. An EEG indicated a disturbance of function affecting the right temporal area consistent with some type of temporal lobe seizure. The record suggested a vascular atrophic process rather than a neoplasm.

Psychiatric Evaluation: Born on a farm, he was the youngest of fourteen children of whom five were boys. All his siblings were said to perceive pain normally. His father was described as kind and understanding but "strict." Of his mother, he said, "she was one of the most understanding women I have ever known." However, he said he had no common interests with his family and did not feel close to any of his siblings. The only family activity in which he participated was helping his mother and sister with chores. Since these tasks were regarded as woman's work, he was branded a "sissy" by his peers, and as a consequence he got into many fights, all of which he claims to have won. He said that his superior strength was responsible for his isolation from the other boys, since he might injure them in games.

He stated that it was his desire for an education that set him apart from his siblings. He said he loved to study and tended to withdraw from the others in order to read and experiment. The patient had an unsuccessful year at a seminary to which he was sent because his father felt it would be a good place to get further education, although the son had no interest in religion. The father then suggested that if the patient had "guts enough" to finance the first year of college, he would help him after that. When the patient proved he could do this, he received support which enabled him to complete the degree in electrical engineering.

The patient tended to boast of his ability to work hard and said he did so from an early age. His adult life, too, was described as continuous work and study, but he said he always enjoyed what he was doing and therefore never felt burdened. He started his own business in 1916 which he operated with considerable financial success. He had two unsuccessful marriages and had avoided establishing roots, except for his business. He lived on a boat from April to November and in a house trailer the rest of the time.

The patient was rather grandiose in manner and gave the impression of exaggerating a good deal; however, those statements which could be checked turned out to be accurate. He was friendly and tried to impress the examiner with his cooperativeness but then almost refused to discuss his insensitivity to pain which was the basis of his referral. Although he formerly considered his insensitivity to pain as an asset, he now thought it to be a handicap, since he felt he was unable to describe the symptoms which would better enable the doctors to diagnose his heart condition. Productions tended to ramble; he paused frequently to describe anecodotes illustrating his intellectual and physical capacities. Sensorium was clear and memory was apparently intact.

Psychologic Examination: Mr H. plunged into the examination with gusto. He was skilled in concealing his deficiencies and did not betray his anxiety nearly as much as did the other patients. In this he was aided by a combination of fanciful thinking that bordered on the magical, a store of narcissistically gratifying business, professional, and personal experiences, and a degree of philosophical detachment.

The obtained I.Q. of 122, indicating superior intelligence, was lowered by a profound drop on some of the measures of visual-motor organization. These failures, and others in which his execution cannot match his intention, reflect some diffuse organic brain damage, probably associated with advancing years. He showed an almost total helpless impotence at one point, but he characteristically overcame this by "solving" a

complex engineering problem in its midst, thus turning defeat into triumph. His thinking was at times shallow, at times idiosyncratic, but it remained within the limits of reality.

His Rorschach showed a vagueness of perception which he sought to rationalize by a defensive selection of exotic locales visited in his extensive travels. His images were crude, but they had a kind of superficial "precision" about which he could be very positive, since the observer was left with no way of checking them. This patient's realm of life experience had been vastly different from that of the preceding cases. Whereas they showed close ties to family and a very local community, Mr. H. had been a man of the world, and he lacked close personal relationships. He conceived of himself as a trouble-shooter for government agencies, a confidant of tycoons in industry; his identifications quite literally were on a national rather than a personal plane. One of his recent jobs, the development of doors impervious to radiation, was interesting in light of his symptom. He was grandiose in describing himself as a "brute for strength" when he was young and in telling of the kinds of jobs he had as a boy, which were fraught with unusual dangers.

This man had no close object relations, and while he took pride in his utter freedom and independence, he showed a touch of wistfulness at the realization that "something was lacking" in his life. He was not a cold person, but he seemed to relate to others on the basis of respect and admiration rather than love. He demonstrated great sympathy for the underdog and nonconformist and corresponding antipathy for those he considered ostentatious. He saw himself as a "loner" and he felt others may have thought he was "a bit cracked," so these sentiments represented a partial identification with people "different" from the prevailing norm. At the same time, he played the "sage," and continually made his TAT stories into morality tales, showing a detachment from current feelings similar to that indicated in his Rorschach. He manifested a feeling of pride in those aspects of himself he felt were uniquely strong, wise, important to the national welfare, and eccentric. He tried to give the impression of being an unsentimental, tolerant, knowing person.

He was not entirely successful in maintaining this image of himself, probably because of recent signs of physical and mental decline. While he loathed self-pity, he was ashamed and disgusted with these signs of decline. He saw his trouble as a lack of self-discipline. He characteristically vacillated between bursts of such contempt at his condition and the feeling that his full powers were returning, a denial that anything might be wrong.

Despite indications of grandiosity, some magical thinking, and the lack of any close emotional ties, this patient showed considerable capacities for a person his age as well as a history of productiveness which was not notably impaired by his eccentricity.

PSYCHIATRIC-PSYCHOLOGIC SUMMARY

These three patients showed general psychological features in common.

1. All three patients had come to the hospital because they experienced a degree of discomfort unusual to them, to which they reacted with feelings of shame and/or disgust. Their indifference to somatic pain was found incidentally during their evaluations; it was not a presenting symptom. Patients 1 and 2 regarded their insensitivity to pain as an asset; patient 3 now seemed to regard his as a liability, because it hampered his ability to describe symptoms which might help physicians diagnose his medical condition. However, as recently as the time of admission to the hospital, he felt it was a sign of strength.

2. With respect to other persons' reactions to pain, all three felt to a certain extent that others were "sissies." They felt that others were "different," not they. Patient 3 remarked at several points that he had no sympathy

for those who felt sorry for themselves; patient 2 was scornful of "weakness" in others, and was proud of his five sons who were likewise insensitive to pain.

3. The mechanism of denial was prominent in all three patients. They denied any weakness, helplessness, and passivity, and insisted on independence, invulnerability, and strength. They were not inclined to pamper themselves to give in to illness. Patient 1 was unconsciously threatened by fears of bodily disintegration. Patient 2 was to some extent aware of his fears and was self-protective, and his feeling of invincibility closely resembled a reaction-formation. Patient 3 needed to reassure himself magically that he had lost none of his power.

4. These feelings of invincibility, a narcissistic sense of omnipotence, were central in the identity of all three patients. All three showed some grandiosity in the sense that they regarded themselves as stronger than most people and able to overcome greater obstacles.

5. Because it was difficult for them to empathize with the sensitivities of others, they tended to compensate with an exaggerated concern for the feelings of others. Patient 1 valued tactfulness and gentlemanliness and despised rudeness. Patient 2 felt the necessity of humility in behavior to avoid giving the impression of haughtiness, and patient 3 felt great sympathy with "underdogs and have-nots," and he was particularly outspoken against ostentation and snobbery. These reactive features helped them to contain aggressive feelings.

6. All three showed some inhibition in the capacity for object relationships. Patient 1 seemed to have close, warm, and steady but somewhat inhibited ties to objects; he was also dependent on maternal figures. Patient 2 reported close ties to his siblings. This was manifested in adult life as sibling rivalry, which could be seen in his competitive relations with others. Patient 3 was isolated and detached, with no strong ties to love objects and he was becoming aware of a void in his life.

7. All three were able to experience anxiety; all three insisted that they "do something about it" rather than remain uncomfortable. There was little information about their reaction to pleasurable feelings; they appeared to enjoy pleasures normally, although there was a certain diminution of sensuousness among them. They showed greater than usual concern about ethical and moral conduct, and demanded more of themselves than of others in these spheres of behavior.

8. All three patients manifested strong investments in work. All described themselves as hard-working from early childhood and able to withstand unusually great burdens. Patients 1 and 2 had held at least two jobs concurrently during the greater part of their working life. All were industrious, responsible, and conscientious, and they possessed a strong sense of duty.

9. Examination revealed no evidence of psychopathology which would be considered outside the broad limits of the "normal character." Patient 2 showed some evidence of an hysterical personality in the classical sense; both he and patient 3 had mildly hypomanic features.

DISCUSSION

In a recent review, Ogden, Robert and Carmichael (3) put forth criteria to establish the diagnosis of congenital indifference to pain and to differentiate it from such other sensory disorders as progressive sensory neuropathy of children and non-progressive sensory neuropathy of children. As it is known that mental defectives may show considerable indifference to painful stimuli, these authors felt that such patients should be differentiated from those with true congenital indifference to pain. Consequently they eliminated several cases of mental defectives that had been reported to have the syndrome of congenital indifference to pain.

In summary, Ogden and coworkers suggest the following diagnostic criteria for congenital indifference to pain: 1) absence of a demonstrable lesion involving the sensory pathways, 2) the threshold for various forms of stimulation should be normal and the tendon reflexes should be normal, and 3) the only abnormality should be the defective reaction to strong noxious stimuli. This integrity of sensory pathways distinguishes congenital indifference to pain from other disorders. Our cases would fulfill these criteria.

The majority of the reported cases of congenital indifference to pain have occurred in younger individuals. Some reports have suggested that indifference to pain tends to subside as the individual ages. This was not true in this series. At ages 67, 56, and 42, the indifference to pain was apparently as marked as it had been in childhood.

Special senses remained intact. As best as could be determined, pleasurable stimuli were appreciated within normal limits.

The indifference to pain was present in all three patients to all forms of noxious cutaneous stimuli. However, each patient seemed to have some perception of visceral pain. It was impossible to ascertain objectively the degree of discomfort caused by visceral stimuli, but it was the impression of the examiner that it was somewhat defective.

None of these patients had experienced the frequent severe injuries commonly reported in the literature. Each patient stated that he had learned to avoid stimuli that would prove injurious. The question, however, remains: What difference exists between this type of patient and those who experience severe injuries in early life who do not seem to develop this ability to avoid dangerous stimuli?

The etiology of congenital indifference to pain is unknown. The meager pathologic studies that have been performed on verified cases have provided no answer. The similarity in personality characteristics of our three patients raises the question of psychogenesis; yet the opposing argument has equal and perhaps greater validity: that the indifference to pain was itself a strong determinant of the personality pattern.

The defect is apparently not inability to perceive painful stimuli, but rather is failure to appreciate such stimuli as unpleasant. Critchley wonders if congenital indifference to pain may simply happen to lie at one end of a pain spectrum—with the other end represented by patients who are constitutionally hypersensitive to pain. The large groups of individuals near the middle of these two extremes would then represent the mass of the population, and tendencies in one direction or another would explain the highly varying tolerance to pain that is noted from person to person.

The importance of recording additional observations on congenital indifference to pain is obvious. If an organic lesion could be found to explain this disorder, and the surgeon could reproduce this lesion, thereby altering higher level pain appreciation without producing personality derangement or neurologic deficit, the treatment of intractable pain would be advanced greatly. Also of great importance is the contribution that an understanding of the mechanisms of this condition would make toward our knowledge of the relationship between mind and brain.

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FOLK PSYCHIATRY IN HAITI

ARI KIEV, M.D.[1]

INTRODUCTION

With the rapid growth of technology and urbanization in many underdeveloped areas, the Western psychiatrist has opportunity to see patients affected by cross-cultural conflicts (2), economic displacement (4) and changing social structures and values (7). Often the patients' problems are directly due to social and economic stresses. Often their behavior is reasonable in terms of their culture of origin. Patients frequently have notions of mental illness and expectations of treatment, based on their experiences with folk forms of psychiatry, knowledge of which can be of value to anyone treating them. In this paper one such folk psychiatry will be considered, that of the Voodoo religion in Haiti today, and an attempt will be made to determine if the Voodoo priests' functions meet minimal criteria for what could be considered psychotherapy.

Until two years ago Haiti's only psychiatric facility was the Pont-Beudet Asylum in Croix de Bouquet. Accommodating two hundred and fifty patients, it provided merely a way for isolating society from a handful of the mentally sick (8). With a population of four million, the cases in need of treatment are probably far greater than the number receiving such treatment. The educated and wealthy send their psychiatrically ill to Europe, the United States or Tortu Island, north of Haiti. With the exception of the cases treated at the new psychiatric clinic (which in 1958 treated four hundred patients) most Haitians still rely on native forms of treatment (11).

Voodoo, the folk religion of Haiti, is derived from an amalgam of Catholic theology and African animism. It is transmitted as a family and small group cult and serves the religious and spiritual needs of much of the population. Although not highly codified, Voodoo beliefs, transmitted orally, do present a fairly systematic set of ethical and moral prescriptions for living (10). It is in the framework of the Voodoo church that psychiatric illness (folie) is dealt with, as are other medical ills.

PERSONALITY THEORY

The Voodoo belief is that human beings are composed of three parts: the body (corps), the big good angel (gros bon ange), and the small good angel (petit bon ange). The small good angel is the protector or guardian spirit of the person. It fights bad spirits day and night and provides information concerning the presence of danger. It confers the power to dream and the power to remember a dream. The big good angel is the soul and gives power to feel, will and understand. The small good angel is inseparable from the body. The big good angel is not and can travel away from the body without death occurring. This can occur during sleep or through the magic of a sorcerer (boca). Both good angels are of the same sex as the person to whom they belong. The big good angel is located in the head. The small good angel is located in the eye or heart. After death both angels are free to go to the kingdom of the invisible (6).

Both good angels are critically associated with spirit possession, which has a paramount role in Voodoo. When a loa (Voodoo deity) choses an individual as its earthly representative (cheval) it supplants his big good angel. The individual then acts as the vehicle of the loa in accordance with a recognizable pattern characteristic of "his"

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loa. Possession usually occurs during ceremonials but may occur in other situations. It signifies acceptance and selection by a loa and is sought after.

NATIVE THEORIES OF PSYCHIATRIC ILLNESS

Illnesses are of two types; natural and supernatural. Natural folie is characterized by calm behavior, refusal to talk and refusal to eat and frequently lasts up to eight months. Supernatural folie is characterized by excitement, excessive talking, aggressivity and clothes-tearing and is usually short-lived, sometimes lasting only several days. The latter is attributed either to the magic of sorcery or to an angry loa.

A sorcerer can replace the big good angel of an individual with the soul of a dead person. The individual's subsequent behavior is believed due to the dead soul reincarnated in him, which has overcome the small good angel and taken control of his mind. Similarly a sorcerer may send a variety of bad spirits, ranging from tuberculosis to epilepsy to the symptomatic manifestations of other illnesses. He may send the spirit of a thief or that of a dog, the nature of the spirit being determined by the manifestations in the patient.

If an individual ignores the dictates of a loa it may take possession of him, replacing his big good angel and causing insane behavior. This differs from ceremonial possession in that the individual cannot be brought out of this state by ordinary ritualistic means.

Natural folies which are curable only during the early stages of illness are caused by severe frustrations in life, weakness of the brain, too much intellectual effort, as in excessive studying, or by certain unfulfilled ambitions. One famous case in Port-au-Prince concerned a man with political ambitions who never succeeded. "Now he is crazy and believes he is a Senator . . . It is impossible to cure him because now he has reached his goal—he lives in a dream world." Natural folie is also characterized by the departure of the big good angel from the person.

Depression (chagrin) is believed to follow unfortunate life experiences and is said to have its own course. The depressed have a special soul which has temporarily replaced the big good angel. Since this soul represents neither a malevolent spirit nor an angry loa spirit, such problems fall outside the province of folk treatment. Hereditary folie, which would seem to emcompass congenital defects, birth trauma and inherited mental deficiency, are believed to be incurable and as such are eschewed by the wise and honest hungan (Voodoo priest-doctor).

TREATMENT

Natural illnesses, which encompass everything from infectious diseases to chronic degenerative diseases, are treated by hungans and mambos (Voodoo priestesses), leaf doctors or physicians, according to varying criteria such as severity of illness, customary local practices, availability of competent practitioners and ability to pay. Supernatural illnesses can be treated only by hungans and mambos.

When a patient visits a hungan for treatment the hungan first determines by divination whether the illness is supernatural or natural. He is usually possessed for this since he must rely on the power of his loa. Divination techniques consist of such things as water-gazing, automatic handwriting (wherein the loa guides the hand of the hungan), or card reading. How the hungan can make this distinction is a "trade secret." It would seem that he relies heavily on paid informants, relatives and the patient for a detailed account of the patient's activities, hoping to learn whether or not the patient has offended another individual who sought revenge through the magic of sorcery or whether he has offended a loa. According to most hungans it is necessary for the patient "to have faith in God," "belief in Voodoo," or have "faith in me" in order to effect a cure.

To put out a devil spirit the hungan uses magic to counteract the sorcerer's magic. Ability to use countermagic implies knowledge of black magic and not infrequently there are hungans who "practice with both hands, "*i.e.* work both as sorcerers and as hungans. The good hungan uses such knowledge for curing only. A few examples will serve to illustrate the general pattern and nature of such practices. "You buy a couple of white pigeons and cut off their heads. Drop three drops of pigeon blood on the patient's head. Then rub part of the pigeon on the patient's head and with another part make friction on his arms. This is good only in the first part of the illness." If there is no success with such treatment it is necessary to try leaf medicines. "If you have to use leaves . . . can use the herb loup garou mixed with water as a tea to put out the devil spirit."

A crude form of shock therapy is sometimes used to frighten out the devil spirits. Here the hungan sprays the cheeks of the patient with a foul-smelling mixture of secret medicines, rum, cannelle, spice, mustard, pepper and vinegar. Another empirical remedy (for epilepsy caused by black magic) consists of undressing the patient, bathing him, burning his clothes and mixing the resulting ashes with indigo. Then with a sharp blade the patient's arm is cut open allowing blood to freely hemorrhage. The indigo-ash mixture is then rubbed over the entire body save for the lacerated area. This treatment puts out the bad spirits from the head, thereby relieving the epilepsy.

When a man previously not a Voodoo adept is possessed by a loa he must undergo a special ceremony to appease the loa. The hungan conducts a ceremony for each loa in order to elucidate the identity and demands of the possessing loa, in order to stop this temporary folie. This folie seems to be more common in individuals who have dissociated themselves from the mainsprings of Voodoo belief through conversion to Protestantism or social advancement to more sophisticated circles. Whatever the specific psychological factors involved, much of the conflict centers around their suppressed desire to return to Voodoo.

The animated atmosphere of ceremonies stimulated by rhythmic congo drums, rum, dancing and spirit possessions offers a unique treatment setting. The following is a description of such a ceremony, given for a four-year-old with weakness, apathy and anorexia of a week's duration. As the ceremony began the hungan, facing his altar, prayed, recited the rosary and chanted an invocation to his loa. Slowly his lower back muscles contracted, the contractions spreading to other muscles in his neck and face. Grunting and grinding his teeth he spoke (in African dialect) in harsh guttural tones. Gradually his countenance changed. His lips moved back and forth in sucking movements, his face and neck muscles continually contracted and his eyes became vacant and hollow as he stared off into space. He was possessed and the master of ceremonies (la place) placed a large sombrero atop his head and a red scarf around his shoulders, symbolic of the loa possessing him.

From beneath the table top altar, covered with flags, dolls, bottles and various symbolic paraphernalia the hungan's assistant (main hunsi) brought forth five pots, a packet of cotton and a stale pie crust, all of which she placed before the hungan. The center pot contained goat's blood. The other pots, filled with food scraps, were placed around the central pot. Little cotton tips were soaked in alcohol and placed on each of the letters of the boy's name, written with goat's blood on the pie crust. They were then set aflame. Alcohol and chunks of meat were then added to the pot of blood and set aflame.

The young patient was then passed across the burning flame first upright and then upside down. Then the hungan washed the boy's head with the goat's blood mixture and passed an egg over his body. The patient was then given some chicken and began

eating voraciously. During the meal the hungan snapped a whip in the air to drive away the evil spirits. He then picked out a silver necklace from the goat's blood mixture and gave it to the patient, discarding an old necklace. Next the pie crust was divided and the pieces were placed into each of the four food boxes, along with a few centimes. The boxes were then deposited outside the temple (hounfort). The hungan danced a solo and the group sang praises to his success.

During the ceremony the main hunsi guided the drummers, supplied cigarettes and rum, led the group in singing and assisted the hungan in maintaining a group spirit. Throughout the ceremony the hungan was possessed. Periodically he seemed withdrawn and depersonalized and involved in his own grandiosity but he never actually lost sight of the situation. When the group seemed less organized or the drum rhythms vague he shouted out angry commands and obscenities. After several hours he sent out a runner for refreshments which he distributed, creating an atmosphere of benevolence and good will. By about eleven o'clock, five hours after the ceremony began, everyone was happy and spirited, the little patient was contentedly nibbling on a chicken leg and the patient's father was thrilled over the cure.

THE HUNGAN AND FOLIE

Some authors have written that primitive shamans are recruited from the ranks of neurotics and psychotics (1, 9). It is of interest to consider the Voodoo theories concerning folie and the hungan in terms of such observations.

An individual becomes a hungan by following and learning the practices, customs, and secrets of the Voodoo cult. By observing and assisting an older hungan and by traversing the church hierarchy of ranks from canzo to hunsi, he may acquire the necessary skills. The selection of this career is determined in two ways. If a person is bright, has a knowledge of leaf medicine and seeks the power, prestige and remunerative benefits of the priestly office, he can buy the power from another hungan. This means he pays for information about the techniques and often practical instruction. "Receiving a call from the gods," is a more common approach to the priesthood. Such a "call" may take the form of dreams where "the loa speaks in his head and is like a horse on the head." In most instances the first manifestations of loa possession are indistinguishable from folie. If an individual does not accept the call of the loa he may be punished with sickness or insanity.

Accepting the "calling," an individual usually experiences another dream and "the supernatural power of the mystery speaks in your mind and you visit a hungan." An ill-defined apprenticeship period follows. Clever devotees often acquire the necessary knowledge in one month; others take longer. The famous mambo, Madame Laurent, said she acquired the knowledge in two weeks time through intuition. Not all who visit a hungan, whether they are "called" or whether they select the role, are given the asson (a gourd lined with religious beads which is symbolic of the office of hungan). If during the ceremony of the asson (graduation) the individual fails to receive manifestations of the loa in the form of recognizable possession it indicates the loa's refusal to accept him as a hungan.

It is easier for a hungan to develop folie than anyone else. This is due to the enormous responsibilities to the loa with which he is charged. "If one day he forgets to honor his god, the god will punish him. . . If during a ceremony he forgets he can become crazy." When this happens he loses his power. Usually the hungan has lost favor with his loa, but occasionally folie occurs when a more powerful hungan sends a bad spirit. When folie occurs the la place tries to ascertain in various ceremonials the cause. "If a miracle happens" the hungan is cured. If he dies death is attributed to loss of favor with the gods. Most hungans die of "old age or in-

sanity." For those who have bought the power, folie occurs when they cannot manage or control it.

DISCUSSION

Although psychiatry is a relatively young discipline psychiatric illness and treatment are of course not new. In Haiti, where modern methods have only recently been introduced, one can still study more primitive techniques or folk methods still in use. We have been interested in examining the folk psychiatry of Haiti and in determining whether the hungan's functions could be considered as meeting minimal criteria of psychotherapy.

The hungan has gone through a period of training, studying certain notions of human behavior, psychopathology and treatment. He enjoys a privileged status and reputation in accordance with his success and influence. In addition he has access to the symbolic paraphernalia of his office which add further to his influence. He is aware of the value of faith in successful treatment, and in putting responsibility for illness on sorcerers or the gods, he has ready-made rationalizations for therapeutic failures, rationalizations which are acceptable to the community as well as the patient.

Voodoo theories on psychopathology derive logically from native notions of personality configuration, and the treatment derives logically from such theories. If by psychiatry we mean a system of treatment for disorders of thought, mood, and behavior based on a theoretical conception of "normal" human behavior, then the model presented by Voodoo fits the definition well. The Voodoo theory offers an acceptable notion of etiology, disease description, dynamic and economic analysis, as well as notions of heredity, patient responsibility, prognosis and treatment. The wise hungan is able to make a number of diagnoses comparable to our own classification system. The Voodoo psychiatry acknowledges a number of syndromes suggestive of depression, dementia praecox, acute schizophrenia, acute mania, hysteria, paranoia and mental deficiency. The wise hungan recognizes—within the limits of his technical and theoretical armamentarium—those illnesses which are treatable and those which are not, as for example in his shrewd recognition that dementia praecox cannot be affected by his repertory of skills.

It is of course true that as regards content and conception the Voodoo psychiatry differs widely from modern theories. But in therapeutic structure and identification of functional and organic syndromes the similarities are great. Concerning treatment, the patient, as in Western societies, relies on the hungan to bring relief, and favorable expectancies are reinforced by the setting of treatment and the technique of cure. In addition the hungan has faith in treatment method, faith in the patient's capacity to respond to the treatment and he follows a definite procedure, embodying all the dynamic features which Frank has shown characterize the psychotherapeutic relationship (3). In addition the hungan's frequent initial pessimism introduces ambiguity, raising the suggestibility and anxiety of the patient and increasing his desire to please the hungan. The connection of treatment with dominant values further increases therapeutic potential and enlists the valuable support of the community, which further reinforces the patient's faith in the hungan.

SUMMARY

Examination of Haitian folk practices reveals certain facts concerning a normal and abnormal theory of human behavior and a method of treatment for certain disorders of thought, mood and behavior. The Voodoo folk religion provides not only religious and spiritual guidance for the people, but also a reasonable theory and treatment method for the psychiatrically ill. Examination reveals certain striking similarities between the therapeutic framework of Voodoo and that of Western psychiatry. Awareness of such folk medical systems is of more than academic

interest today, especially because of the development of modern clinics in many of the underdeveloped areas of the world. Natives entering such clinics usually bring preconceived notions and expectancies of psychiatric treatment that are conditioned largely by their experiences with such folk psychiatry.

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GULLIKSEN, H., AND MESSICK, S., EDS. *Psychological Scaling: Theory and Applications.* Wiley, New York, 1960. xvi + 211 pp. $7.50

The past few years have seen the publication of a number of works on psychological scaling: Edwards' *Techniques of Attitude Scale Construction*, primarily a "cook book"; Torgerson's *Theory and Methods of Scaling*, a weightier volume, both literally and figuratively; and Thurstone's *The Measurement of Values*, presenting the development of his ideas in this area from 1927 to 1954. Scaling has come a long way since Fechner's treatment of the psychophysical problem; investigators are concerned not only with the measurement of sensory magnitudes, but also with the assessment of mental abilities, the appraisal of attitudes and values, and even the prediction of consumer choice behavior.

The present slim volume is the report of a conference jointly sponsored by Educational Testing Service, Office of Naval Research, and Princeton University in the Spring of 1958. Authorities on the quantification of subjective judgments assembled to review the present status of their field, and to consider possibilities for the future development of scaling theory and methods. The 14 papers collected here are for the most part rather highly specialized technical contributions which presuppose considerable sophistication on the part of the reader. Those whose specialty is not quantitative psychology are advised to turn to an introductory treatment of scaling before tackling the Princeton conference report.

A. B. Silverstein

NACHT, S., ED. (American adaptation prepared by Ruth E. Roman). *Psychoanalysis of Today.* Grune & Stratton, London and New York, 1959. vii + 228 p. $5.75

This neat little volume promises a great deal at first glance. The Table of Contents indicates eight chapters, by various authors, summarizing the position of the French Psychoanalytic Institute on analytic theory and practice, from child psychiatry to sociology. In addition, we note that this is a selection and condensation from a two volume French Edition, "La Psychanalyse D'Aujourd'hui" by Dr. Nacht. Herein lie its major recommendations and its shortcomings.

For someone conversant with psychoanalytic theory and concepts, the presentation of the French view is both interesting and instructive. This is especially true as one feels the absence of a "special point of view" associated with one or another analytic group in the USA. Thus, the evaluation of the historical perspective in analysis is objective, careful, and fair. The indications for analysis, as presented by Nacht, are concrete and conservative. Chapters on the relation of psychoanalysis to neurophysiology, medicine and sociology present a schematic view, but one which is obscured in many places by the problem of condensation and translation.

For a reader unfamiliar with modern psychoanalytic writings, this book is definitely not useful. In many places, the "Reader's Digest" quality is inescapable, and the explanatory material, the relevant development of concepts, has been whittled away in making the condensation. The translation, *per se*, is better than average, but still suffers from some almost unavoidable technical difficulties which make reading less than smooth, *i.e.*, where we use "inter-personal relations," we find "the relational situations."

This is definitely a worthwhile effort to present a summary of the French view. It is too meaty for the very audience towards whom it might best be directed, however,

and thus is left for the much smaller and more specialized reception of readers already familiar with the concepts presented.

Allan R. McClary

MENDELSON, MYER. *Psychoanalytic Concepts of Depression.* Thomas, Springfield, Illinois, 1960. xii + 170 p. $6.50

Dr. Mendelson has produced a scholarly and comprehensive survey and critique of the psychoanalytic concepts of depression. It is rare indeed to find someone not actively engaged in the work of psychoanalysis itself who could explore the scope of a particular phase of the field, as this author has done, with such a measure of objectivity and such a sense of the value and limitations of its concepts. Perhaps the author's relative non-involvement in the work of psychoanalysis has given him a perspective difficult of attainment in other terms.

The book itself attacks the difficult task of dissecting the psychoanalytic theories of depression from several vantage points. After a brief consideration of a limited number of non-analytic points of view as an attempt to supply a descriptive picture of the depressive disorders, the author discusses consecutively the theoretical views on depression of Abraham, Freud, Rado, Gero, Klein, Bibring, Jacobson and Cohen and her group. Dr. Mendelson then regroups the data and discusses it under the principal recurring themes developed by the above authors. This is followed by chapters on diagnostics, treatment and a concluding chapter, which last is most heavily weighted with the author's own views.

A survey book of this quality is of a high level of usefulness both as it points up the contributions already made and insofar as it emphasizes, in the negative sense, the many problems yet unexplored. While the author touches upon the subject, the full implications of the potpourri of affective states which go by the name of depression are not adequately elaborated upon by him. A wide span of affective states of unpleasure extending from the depressed stage of manic-depressive psychosis to existential states of isolation, emptiness and loneliness are tossed in the same hopper. To some measure the differing emphases in the various theoretical formulations no doubt derive from the attempt to describe quite different affective states.

The broader deficiency of any even reasonably adequate theory of affective states in psychology, psychiatry or in psychoanalysis reflects itself in the particular sphere of affective disorders known as depression, as might be expected. Psychoanalytic theory during the years of its development became increasingly abstracted from the consideration of affective states as "felt experience." A survey of Freud's earlier correlation of libido with love and later view of libido as psychic energy capable of attaching and detaching itself from objects, and by no means related to any specific affect as such, points up this dilemma. With the development of ego psychology the issue underwent little clarification. So, the affective state of depression is said by some to be a resultant of a reduction of self-esteem, presumably a function of self appraisal of some order quite separate in kind from the affective process itself. As one can see, the intellectualized process as a necessary condition for the origin of emotional states such as depression infers a certain ordering of experience which seems to speak more for a bias in favor of our tendency to intellectualize than a description of the actual "felt experiences" themselves. This writer would be the first to admit the difficulties of describing these events in more appropriate terms.

As a psychoanalyst engaged in clinical work, the requirements—at the least—for some kind of broad framework, within which to view the affective state of depression, cannot be gainsaid. It is in fact easier for the clinical investigator to explore intermediary mechanisms within an appropriately modest experimental situation than

to direct oneself to such exploration when faced with the full impact of a patient in distress. Clinical practice demands that one employ the best available hypothesis in a given immediate situation in a fashion which would be hardly excusable in the scientific laboratory situation. While the possibility of errors and false leads is indeed multiplied in this fashion the matter of expediency must be the order of the day in dealing with immediate human suffering.

The trend in psychoanalysis towards a psychology of the ego, as opposed to the id, seems the most congenial, of all the views expressed, to the author of this book. This is a popular trend within psychoanalysis and has made many of the more recent views more acceptable to the non-analytic psychiatrist in general. This correlates with the greater ease with which the data of ego psychology can be examined by usual scientific methodology. The writer would like to offer a word of caution, however. The ability scientifically to validate certain types of data might well precipitate us back into a one-sided view of human functioning. Most difficult to validate are the phenomena of id psychology and of primary process activity as opposed to ego psychology and secondary process phenomena. In the same fashion the introspective, intrapsychic processes, including affective experience, lend themselves much less well to examination by usual methodology than do interpersonal behavioral and verbal transactions, and social transactions involving larger groups.

Dr. Mendelson recurrently makes mention of the earlier closed system of psychoanalysis as opposed, apparently, to his present view of psychoanalysis as a more open system. It is the reviewer's surmise that this is a common misunderstanding based more upon the personalities of some of the earlier contributors to psychoanalysis than upon psychoanalysis as a theoretical system. The later contributions appear to this writer as logical and necessary outgrowths of the earlier ones which would hardly bespeak a closed system. I am inclined to see less disparity between the earlier concepts of orality, using the term in both its narrower and broader sense, and the later theses having to do with the complex structure of the ego, than does Dr. Mendelson. The human personality is a complex system functioning simultaneously at numerous levels at the same point in time. Some of its activities are correlated but others may be operative in highly unrelated and even contradictory fashions within the psyche. Clinically this cannot be denied, but, if one attempts to validate such a system, one must conceptualize a body of multiple variables that has largely defied any global approach along strictly scientific lines.

The reviewer shares the author's desire for more extensive clinical studies, well conceived and designed so as not simply to attempt to bear out one or another preconceived notion but based on some of the available suggested hypotheses. I heartily recommend this book to the psychiatrist and psychoanalyst who would wish an overview in this particular field.

Samuel Novey

La Société Française de Psychanalyse. *La psychanalyse*, Vol. 5. Presses Universitaires de France, 1959. 334 p. 15 Nv. Fr.

This is the fifth in a series of theoretical and clinical papers published by the French Psychoanalytic Society. Although a wide range of subjects is covered, the emphasis is literary and philosophical.

The eleven theoretical papers include an evaluation of Ernest Jones' theory of symbolism by Jacques Lacan and a penetrating discussion of Freud's literary talents by Jacques Schott. Of particular interest to lovers of the theater is a brilliant analysis by O. Mannoni of the psychological mechanisms involved in creating for the spectator an illusion of reality.

Three clinical papers are included and they are of particular interest because they deal with subjects too often neglected by analysts. Jean Clavreul's article, "La Parole de l'Alcoolique," deals, in a general way, with the numerous problems encountered in the psychotherapeutic treatment of the alcoholic. In a well-documented paper, M. Mannoni discusses the diagnostic evaluation and psychotherapy of cases of true and pseudo feeblemindedness. Jacqueline Schweich concludes the series with a lengthy case-history and treatment summary of the case of an occupational misfit. Her use of the case as a springboard for a theoretical discussion of the psychology of the tramp is extremely interesting.

In keeping with French psychoanalytic traditions, this collection of essays is characterized by impressive erudition, imaginative thinking, and admirable lucidity.

Walter Weintraub

EPILEPSIA: Journal of the International League against Epilepsy. 4th series. Vol. 1, No. 4/5, June, 1960. Elsevier, Amsterdam.

In June of 1960, a publication of unusual interest appeared. This was a special oversized issue of EPILEPSIA dedicated to Dr. William Gordon Lennox, whose name has been so closely identified with epilepsy for more than a quarter of a century.

The roster of authors in this Festschrift is imposing indeed and includes many of the most prominent workers in the field, from many countries. The papers themselves embrace all aspects of the multifaceted problem of the convulsive disorder, from basic physiologic mechanisms to clinical and psycho-social aspects. New data and new ideas are present in abundance and those who do not yet see EPILEPSIA regularly will find it a stimulating introduction to this new quarterly periodical. The publishers are the Elsevier Press in Amsterdam.

WESTWOOD, GORDON. *A Minority: A Report on the Life of the Male Homosexual in Great Britain.* Longmans, Green, New York and London, 1960. xii + 216 pp. $7.00

Gordon Westwood's previous book, *Society and the Homosexual,* was an unusually objective account of many of the important psychosexual and psychosocial aspects of homosexuality. In this new book, which consists of statistical and anecdotal findings from interviews with 127 male homosexuals, the author is again commendably objective and gives as unbiased an account of a sizeable sample of homophiles as to be found anywhere in the literature.

Westwood's sample of homosexuals is, as he himself is careful to point out, far from ideal, and almost certainly does *not* represent a good cross-section of practicing English males who are exclusively or primarily attracted to other males rather than to females. It was obtained on a volunteer basis largely through doctors and laymen who were interested in Westwood's study; and it largely seems to have consisted of fairly respectable individuals of above-average intelligence, of middle class background and status, of good education, and with unusually good adjustment to or acceptance of their homosexual condition. It is therefore by no means representative, this sample, of the vast majority of British and American homosexuals—who, as various other psychosocial and clinical studies have shown, tend to be distinctly less intelligent, more socioeconomically depressed, and more emotionally disturbed than those in Westwood's sample seem to have been. Moreover, as the author also points out at numerous points in this book, the study suffers considerably by having (as yet) no suitable control group with which to compare its interviewees.

Once these limitations are accepted, Westwood's presentation gives much valuable information on the backgrounds, early homosexual experiences, extent of homosexual acts, heterosexual interests, homosexual ad-

justment, work and leisure pursuits, and community integration of his respondents. This information is continually cross-checked with the findings of the Kinsey group, Henry, Liddicoat, Slater, Cory, and others; so that interesting comparative information is provided. Westwood's data are more extensive and intensive than other previous studies in many respects and contains many valuable tables and other first-hand statistics that cannot be summarized in this review. In general, his findings show that although homosexuals in modern British society are beset with many difficulties of social living and sexual adjustment, about three-quarters of those interviewed did manage to make a good or fairly well integrated adjustment to their community, eighty per cent were fairly or very content with their work, only a third were sexually promiscuous, and the majority were accepting of or fairly easily resigned to their homosexual condition.

The reviewer's guess is that this rather good showing of Westwood's sample of homosexuals in regard to their socio-economic, community, and sexual adjustment is largely a function of the particular kind of sample that he interviewed and is not very representative of British or American homosexuals in general. As the author also points out, 65 per cent of his group of contacts "present a very difficult problem [as far as treatment is concerned]. They have adopted a defensive attitude to their homosexual condition and they resent the suggestion that they are suffering from any kind of disease or need any kind of treatment." Westwood himself does little in this volume to dispute this defensive attitude of his respondents; and implies or infers that homosexuals really are not very treatable. He almost completely ignores the favorable results in treating homosexuals found by many clinicians, including Bergler, Allen, Robertiello, Anna Freud, and this reviewer; and he emphasizes the negative statements of some therapists who (as he may or may not know) are themselves homosexual and therefore have little incentive in helping their patients to overcome their homosexual neuroses.

Westwood's errors and prejudices, however, are small and few; and in the continuing studies of homosexuality that he is doing, it would be a pleasure to see his treatment of findings with, first, a much more representative sample of "average" homosexuals and, second, a suitable control group.

Albert Ellis

SHEA, DANIEL. *A Handbook on Mental Illness for the Catholic Layman.* Vantage Press, New York, 1960. 105 pp. $2.95

Anyone who has attempted to purvey his professional knowledge to the non-professional can sympathize with the complexity of the task set for himself by the author, who is secretary to the New York Department of Mental Hygiene. Unfortunately, he does not come near satisfactorily filling any educational need, and may in fact do some small bit of harm in the try. This book is small in size, and tends toward narrowness and shallowness in content and spirit. Its factual statements are meager, occasionally dull, and often incomplete or wrong, as for example in regard to the descriptions of mental illnesses. Its "advice" sections range from the commonsensical to the potentially frustrative and vaguely bellicose. The "definitions" in the appendix, in striving to be elementary, shade into the inaccurate. "Psychoanalysis" is virtually completely misdefined. The condemnation of "Freudian psychoanalysis" implicitly in the name of the Roman Catholic Church is presumptuous and erroneous, and insulting to the scholarly and ecclesiastically approved endeavors of theologians, philosophers and psychiatrists to further our knowledge of, and through, its theories and practice.

John W. Higgins

Ross, Alan O. *The Practice of Clinical Child Psychology*. Grune and Stratton, New York, 1960. x + 275 pp. $5.75

It is apparent that the author is a clinician who is conversant with the problems in clinical child psychology, particularly as they occur in an out-patient mental hygiene clinic. It is with this range of problems that he deals in his book. His professional point of view conceives the clinical child psychologist as a clinician who must and should be able to operate in the broadest sense,—that is, in the various processes of a clinic's work, *i.e.*, diagnosis, treatment, and research. He demonstrates understanding of the interrelatedness of factors in the clinical process when he states, "It is difficult to see how a psychologist can be expected to conduct relevant research on psychotherapy or to be a skilled diagnostician and make meaningful recommendations regarding a patient's treatment potential if he himself has not had training and experience in conducting therapy." He indicates the strength of his professional convictions and image when he further states regarding therapy, "For the purpose of this exposition, we shall state as a fact that the clinical child psychologist is (among other things) a therapist, refusing to be drawn into the debate on who may conduct treatment." As further evidence of his clarity regarding his professional contribution, he sees the psychological testing product as an independent contribution to the understanding of a child's case, and not as so often unfortunately occurs that the psychological testing results' only *raison d'etre* is to concur with already established clinical findings and impressions.

Probably one of the weakest aspects of the book is the author's editorial overemphases and/or omissions. His treatment often deals with topics out of proportion to their significance, and there is, now and again, unbalanced criticism and fortuitous omission. For instance, he criticizes at great length the construction and standardization of the Wechsler Intelligence Scale for Children, (some are well-founded criticisms and others less so), but at no place in the exposition does he accord to the WISC what is reasonably and significantly said of the Binet, when he states, "Aside from the peripheral observations possible in any testing situation, many Binet items are well suited for eliciting material significant of personality aspects other than the intellectual." The author's unconscious feelings may be showing when he reflects, "The purpose of this detailed critique of the WISC is not one of picayune fault-finding. . . ." He might better have remarked, as he states at the beginning of the section on testing, that excellent discussions of the test's standardization, etc., are to be found in such other sources as Buros. And he might better have dwelled on the positive strengths of the WISC as they are utilized in the day-to-day operation by the clinician with parallel comparative comments, positive or negative, regarding such comparable instruments at the Binet.

The discussion of such individual intelligence tests as the Columbia Mental Maturity Test, the Goodenough Figure Drawing Test, and Raven's Progressive Matrices overlooks for the most part the crucial point of their narrow range of content. This factor, in combination with such factors as age and type of pathology, could well provide meaningful organization or hypotheses to the welter of correlational studies between tests in this area. It is unfortunate, too, that the use of the Rorschach in intelligence diagnosis was not considered at greater length. At least passing mention might have been made of the group of paper-and-pencil intelligence tests and standardized skills tests, particularly of reading, with which the clinical child psychologist often must deal, either directly in their administration and/or in the interpretation of their results. The excellent point is made that the request for psychological testing should have a purpose,

i.e., there should be a problem which needs answering. However, in the 'suggested outline for psychological reports,' there is no topical heading for the referring problem. This is an unfortunate omission in an area which receives deserved stress and exposition.

Ross goes to undue lengths to disprove an opinion of Ames *et al.* regarding "the expression of seven-year oldness" in the Rorschach responses of seven year olds in their book, *Child Rorschach Responses*. The author's detailed sequential analyses of the Rorschach protocols of two seven-year-olds might better have been presented in their own right as illustrations of how two individuals with some similar characteristics differ in their personality processes, rather than in the context of a criticism of Ames. And in his final discussion of Ames' point of view, Ross overlooks the fact that the objectives of a normative data collection as that by Ames *et al.* differ from the individual clinical study of a child. In effect, the former is to find similarities, *i.e.*, categories of response, and the latter looks for the individual characteristics, which may or may not be deviant from the norm.

It is not altogether clear in what direction the author is heading in his discussion of the Rorschach, *i.e.*, is he most concerned with test administration, age range or validity. One is left with the impression, even though there are some belated concluding comments to the contrary, that the Rorschach is a fairly nebulous technique with much further validation necessary. When one considers how central the Rorschach is in the clinician's testing armamentarium, the case for the Rorschach's usefulness could have been stated in bolder supportive tones and nevertheless have been compatible with scientific reality and purity. When discussing the validation of the Michigan Pictures Test, Ross quotes from Gurevitz and Klapper, ". . . Placing emphasis upon the statistical use of such data may limit its psychodiagnostic value. . . . As to the danger of subjective interpretations, we feel that the basic structure of any projective test in itself stresses the fact that much of the interpretation is dependent upon the efficiency, the experience, the richness of information of the examiner. . . ." In his introduction to testing, the author remarks that, ". . . the practicing clinician . . . could well be paralyzed into inaction if he decided to use only those instruments which have been shown to have a high coefficient of validity on the basis of rigorous research. . . ." Such forceful points of view might have well been used to underscore the Rorschach, particularly in light of the intended reader audience. The author's attunement to scientific validity is commendable and is not being questioned, but this reviewer feels it is a matter of "editorial weighting" of certain research data which tends to overshadow and blur other clinical and theoretical considerations. There is reason in general to question the scientific validity and basis of many so-called research data whose only claim to objectivity is the use of quantification. On the other hand, there may be much scientific validity to the ongoing observations of the trained clinician, in which there is involved considerable implicit cross-checking and comparison of test sign to behavioral referent. The great discoveries of Freud were the result of astute clinical observation. In this same vein, there is reason to question the author's statement that "we have little, if any, concrete factual knowledge about the type of patient who is most suitable for child guidance treatment. Much of what passes for knowledge in this area is based on unverified opinion and tradition, each therapist having his own private criteria for the type of case with which he considers himself most successful." The area of therapy is not as confused as Ross seems to try to make it. That it is a complex area with a wide range of objectives generated by pathology and human value considerata is not to be denied. The understandings of trained and competent clinicians are not unverified opinion

but possess considerable systematic observation, even though it may not appear in print. Certainly the author speaks with surety and conviction based on his observations when he sets down criteria for the selection of a treatment case. His occasional reversal to the humility of "know little-ness," often resorted to by clinicians, is a contradiction.

The range of simplicity and sophistication of the various topical discussions in this volume is quite wide. The author states that the book is meant for students in clinical child psychology and practitioners in related disciplines. Many of the intensive discussions on research findings as related to test instruments would seem above the level of this kind of audience. Conversely, the detailed explanation of the preparations and preliminaries for test administration is 'old hat' for the clinical student with training.

This book would best be used, especially by the beginning clinician, in conjunction with other selected readings, to include other presentations of practice. Its major value is that it provides a source of points of view of an experienced and talented clinician with respect to many of the problems in clinical practice

Jacob J. Stein

SCHAFFNER, BERTRAM, ED. *Group Processes* (Transactions of the Fourth Conference, October, 1957). Josiah Macy, Jr. Foundation, New York, 1959. 266 pp., illus. $4.50

This book can be reviewed from three points of view: (1) its value as a record for the participants in the Conference, (2) its value as a contribution to learning and (3) as raw material for a case study in group interaction.

Group Processes is a report of the fourth of a series of conferences sponsored by the Josiah Macy, Jr. Foundation. Some thirty biological and psychological scientists, members of the conference and guests, met for a few days to discuss two papers presented by Fritz Redl, "The Impact of Game-Ingredients on Children's Play Behavior" and "Implications for Our Current Models of Personality," one by Alex Bavelas, "Group Size, Interaction, and Structural Environment" and one by Konrad Z. Lorenz, "The Role of Aggression in Group Formation."

The book includes autobiographical sketches of the participants since the previous sessions. These in themselves are suggestive and stimulate the reader to want to know more about the activities of the participants. The discussion of the papers by the participants in the conference is included, and in fact makes up the larger part of the material.

The introduction by Dr. Frank Fremont-Smith states that the member or guest selected to give the presentation was requested not to "read a paper" but to give the highlights in an informal manner. In many instances, however, the highlights were obscured by the comments of others. The conference program of the Foundation is regarded as an experiment in communication and a statement is made that "the further conclusion has been reached, as the result of this experiment, that the major obstructions to understanding among scientists lie in the resistance of human attitudes to change, rather than in difficulties of technical comprehension." This conclusion scarcely seems to be adequate on the basis of this book. Resistance to change is certainly not special to social scientists. But the major obstruction to understanding in this conference, as in most, would appear to be the result of failure to listen for the speaker's meaning—this seems to be a more important factor than resistance to change.

As a record of the proceedings the worth to the participants must be evaluated by them. To an outsider it would seem, however, that a transcript of the minutes would serve the purpose, for it is doubtful how valuable a reference this would be in future years. Experience indicates that most participants to such conferences tend to read

their own contributions more diligently than those of others. Presumably the Macy Foundation feels the need for putting the proceedings between covers, a sort of "vanity" publication, which of course is legitimate.

The presentations were constantly, and intentionally, interrupted. On several occasions those presenting the papers in self-protection had to declare that they would not be "sucked into" discussion of matters foreign to their papers. The interruptions were in themselves frequently as interesting and important as the papers discussed. It would appear, though, that the conference report would be of greater value to a non-participating reader if the papers were given in full and the relevant comments were then summarized by the editor. As it is it is difficult to follow the papers consecutively and one is continually diverted from their meaning by the interpositions. This is not to say that the process of discussion employed by the conference is not in itself of value to the participants, but rather that because of the manner in which these discussions are presented to the public their intrinsic worth is minimized. Many of the comments on the papers contain scientific material of such interest that they deserve better treatment than as part of a stenographic record of the proceedings.

As this conference dealt with group processes, it is only fair to appraise it, as reported, in terms of group processes.

Here was a group brought together to encourage interdisciplinary contributions. It was noteworthy that although about one-fourth of the persons participating were psychiatrists; except for Redl, who presented two papers, and one other psychiatrist, this discipline played little part in the proceedings. Nor was there much conscious effort to bring psychiatrists in. There were others, too, who received little encouragement to take part. In fact, only about half of the participants were actively involved. In other words, though group processes were the subject of discussion, the processes of this group were practically ignored.

There were occasional evidences of hostility as in other groups; and a number of instances of supportiveness. Much information was given. There were some attempts to summarize or explain where the group was at the moment (mostly by Margaret Mead, who gets the laurels for filling most group-membership roles). There was a vast amount of satisfaction of individual needs of expression. There was some status-seeking at the cost of concentrating upon and developing the themes of the papers being presented, especially in the first session.

One had a sense, however, that there was considerable mutual stimulation and that the work of the participants between conferences is affected by the suggestions of their colleagues. Thus though the processes of the conference group itself were not so effective as they might have been had they been more consciously recognized, these conferences appear to have had real value to those who have engaged in them. Though one may doubt the usefulness of this book, the usefulness of the conference was apparent. Perhaps it could be of greater value to the participants if their own processes were improved, and the publication could be of value to a broader audience if the arrangement of the material were adjusted to meet the requirements of such an audience.

James Marshall

ERRATUM

The sixth issue of JNMD's Volume 130 (June, 1960) was a Festschrift in honor of Doctor Ernest A. Spiegel. We have a letter from Dr. L. van der Horst, the senior author of one of the contributions to this issue (VAN DER HORST, L., STAM, F. C. AND WIGBOLDUS, J. M. Amyloidosis in senile and pre-senile involutional processes of the central nervous system. J. Nerv. Ment. Dis., **130:** 578–587, 1960), pointing out that the footnote reporting his academic affiliation was incomplete. Dr. van der Horst is indeed at the Department of Psychiatry of the Municipal University of Amsterdam, The Netherlands, as stated; but he feels it should be noted that the investigation was elaborated at the Neuropathological Laboratory (F. C. Stam, M.D., Director), Valeriusclinic, Amsterdam, with which Dr. van der Horst is also associated.